

**Evaluating the implementation of waste awareness programmes in
Pinetown District schools, eThekweni Municipality, South Africa**

By

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DECLARATION

I, **Snenhlanhla Sandra Buthelezi**, student number **51154196**, declare that **“Evaluating the implementation of waste awareness programmes in Pinetown District schools, eThekweni Municipality, South Africa”** is my own work, and that all the sources used and/or quoted have been indicated and acknowledged by means of complete references. I further declare that I have not previously submitted this dissertation or part of it for examination at the University of South Africa or any other institution of higher learning.

Signature



Date: **19/02/2026**

DEDICATION

This thesis is dedicated to my mother Sarah Nombuyiselo Mthembu who, despite not having the opportunity to succeed and encouraged me to reach for the stars and to my husband Sibonelo Mbanda and my children Minenhle, Asanda and Uminathi Mbanda for their unwavering love and support.

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- Heartfelt gratitude to my family- my husband, daughters and son as well as friends for their love, continued support, motivation and understanding during my challenging yet fulfilling and sometimes overwhelming journey.

ABSTRACT

Since the rise of global environmental issues, environmental education (EE) programmes have exponentially increased in implementation. Environmental education, recognised as a key driver for fostering awareness and responsiveness toward environmental challenges, emerged from several developments shaped by ongoing international forums and dialogues. The momentum for EE intensified after UNESCO-UNEP intergovernmental conferences (1972 - 2012) that formulated goals and objectives for all nations to integrate EE across all levels of education. Therefore, this dissertation evaluated the implementation of EE and waste awareness in the curriculum in secondary schools in Pinetown District, eThekweni Municipality, South Africa. The study employed a quantitative and qualitative research method, hence, a mixed method. A total of 437 learners participated in the study, following formal approval from the KwaZulu-Natal Department of Education and consent from their parents. Semi-structured questionnaires were used to collect primary data from Grade 9 and Grade 12 learners, who were questioned about their level of awareness, knowledge, attitudes and practices. Face-to-face semi-structured interviews were used to collect primary data from teachers to determine the inclusion of EE and waste management within the curriculum and how these topics are taught. Interviews also explored teachers' perspectives on establishing EE as a standalone subject, assigning teaching responsibility, and the presence and content of school environmental policies. For this purpose, the quantitative data was organised, coded, processed, and analysed using the Statistical Package for Social Sciences version 29, while the qualitative data was organised, coded, processed, and analysed using Atlas.ti. The findings revealed that the mandate set by the Department of Forestry, Fisheries and the Environment and the Department of Basic Education to include EE in the curriculum was partially implemented, as learners were aware of various environmental concepts such as "waste," "waste management," and "environmental education." The findings also revealed that subjects such as Life Orientation, Geography and Natural Science in Grades 9 and 12 have integrated environmental-impact topics. The study uncovered a failure to attend, become involved in, or participate in environmental awareness and waste management initiatives organised by the school or local authorities. The study recommends that the Department of Education should implement environmental appointments for EE officers to enforce EE in schools.

Keywords: Environmental education, waste management, awareness programme, curriculum, implementation, secondary schools, environmental issues, learners.

LIST OF ACRONYMS

CAPS	Curriculum and Assessment Policy Statement
CSO	Civil Society Organisation
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DepEd	Department of Education
DoE	Department of Education
DSW	Durban Solid Waste
ESD	Education for Sustainable Development
EE	Environmental Education
EEASA	Environmental Education Association of Southern Africa
FEE	Foundation for Environmental Education
RNCS	Revised National Curriculum Statement
RSA	Republic of South Africa
SGB	School Governing Bodies
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nation Education, Scientific and Cultural Organisation
WESSA	Wildlife and Environmental Society of South Africa

RESEARCH

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Evaluating the implementation of environmental education and waste awareness in Pinetown District schools, eThekweni Municipality, South Africa

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Abstract

This paper evaluated the implementation of environmental education and waste awareness into the curriculum in secondary schools in Pinetown District, eThekweni Municipality, South Africa. The larger research study employed a quantitative research method based on a conceptual design to gather data. In total, 437 learners participated in the study with the permission of the Department of Education in KwaZulu-Natal, and their parents. Semi-structured questionnaires were used to collect primary data from Grade 9 and Grade 12 learners, who were questioned about their level of awareness, knowledge, attitudes and practices. The data were organised, coded, processed and analysed attentively, using the Statistical Package for Social Sciences version 29 for this purpose. The findings revealed that the mandate set by the Department of Forestry, Fisheries and the Environment, and the Department of Basic Education, to include environmental education in the curriculum was partially implemented, as learners were aware of various environmental concepts such as “waste”, “waste management” and “environmental education”. The findings also revealed that subjects such as Life Orientation, Geography and Natural Science in grades 9 and 12 have integrated environmental-impact topics. The researchers uncovered a failure to attend, become involved in, and participate in environmental awareness and waste management initiatives organised by the school or local authorities. The study advises that the Department of Education develop policy guidelines for teaching environmental education, integrate environmental learning outcomes in syllabi, and provide teacher training.

Keywords Awareness programme, Curriculum, Education, Environmental issues, Learners, Secondary schools, Waste management

1 Introduction

The United Nations Conference on the Environment, was held in Rio de Janeiro, Brazil in 1992, the creation of the United Nations Environment Programme (UNEP), and multiple United Nations Educational, Scientific and Cultural Organization (UNESCO)-UNEP



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CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

This chapter briefly introduces a crucial aspect of the study by defining the global environmental crisis. It also provides information that explains and contextualises the background of the research study, followed by a detailed, scientific, unbiased problem statement which specifies what the researcher aims to discover. This chapter further provides the justification of the research with references to relevant and recent literature; it then itemises the research aim, objectives, and research questions of the study. Lastly, this chapter highlights the significance of research results as well as the limitations and assumptions of the study.

1.2 BACKGROUND TO THE STUDY

1.2.1 The Global Environmental Crisis

With the rise of the Industrial Revolution, the global environmental crisis has become one of the most urgent challenges of our time (Meerab, 2023). Beginning in the United Kingdom in the 18th and 19th centuries (1760-1840), the Industrial Revolution progressively spread to European countries like France (1830), Germany (1850), the United States (1865) and other parts of the world (Mark, 2023). This transition brought positive trends to the civil society as cities thrived in areas of transportation, trade, skill acquisition, product innovation, machinery development, and farming methods (Marshall and Farahbakhsh, 2013). The era saw the mechanisation of coal, iron production, cotton manufacturing, steam power and railways during the first phase of the Industrial Revolution, while the second phase featured steel, electricity, and chemicals like oil and gas (Vries, 2008). However, this period was also abounded by deep social consequences (Khwene, 2020), and for the first time in history, humans dealt with unprecedented environmental challenges like pollution, deforestation, climate change, and waste issues (IPCC, 2019; Schot and Steinmueller, 2018). For instance, the expansion of industrial capitalism consumption culture gave way to mass production and mass media

(Kannappan, 2023). The intervention of advertisement, credit systems, and the increased abundance of mass-produced goods resulted in population growth, where rural-to-urban migration reshaped demographic trends, job opportunities, and living standards. The high urbanisation rates resulted in increased extraction and processing of raw materials, and the demographic shift exerted pressure on the use of services and products (Le Courtois, 2012; Godecke *et al.*, 2013). As the population in urban communities continued to increase, improper waste management such as littering and open dumping became a norm (Amasuomo and Baird, 2016). Moreover, because of economic reasons, cities were unskilled in managing waste at a large scale (Oteng-Ababio *et al.*, 2013).

Initially, the problems were perceived as slight inconveniences; however, as time passed, they were recognised as serious health hazards related to the global environmental crisis. Waste management issues were unheard of because the population was reasonably small, and technological advancement was slow (Van Nijkerk, 2014). Waste produced in the pre-industrial society period was harmless, low in quantity, and generally biodegradable (Chandrappa and Das, 2012). The type of waste produced was kitchen waste, animal dung, and agricultural waste, thereby avoiding any form of pollution, because the waste was decomposed by bacteria or other living organisms (Bharadwaj *et al.*, 2015). The organic waste was then used to feed livestock or applied to agricultural fields as fertiliser (Vergara and Tchobanoglous, 2012) as a form of reuse and recycling. These scenarios of unhygienic practices led to sources of odour and contaminated the water resources, which spread communicable diseases (Bello *et al.*, 2016). Indeed, a phenomenon termed Black Death reportedly killed 25 million Europeans; those afflicted died quickly and horribly from high fever and swelling (Kathryn *et al.*, 2021).

1.2.2 International Response to Environmental Crisis

In response to the escalating environmental crisis, a series of continued interventions emerged at international, national, and local levels with the objective of mitigating the negative impacts of climate change, habitat destruction, air pollution, and poor waste management (Tlhabanelo, 2020; Meerab, 2023; Siekmann *et al.*, 2023). This was facilitated through the establishment of robust enforcement mechanisms and targeted

investments in infrastructure to advance sustainable development and protect biodiversity (Nyika *et al.*, 2021). This impetus gained momentum at the 1972 United Nations Conference on the Environment, the creation of the United Nations Environment Programme, and multiple UNESCO-UNEP intergovernmental symposiums for environmental education (EE) (Gough and Gough, 2015). The International Union for Conservation of Nature and Natural Resources (IUCN), established in 1948 in Fontainebleau, France (Britannica, 2023), was the first environmental network concerned with the conservation of diverse ecosystems and sustainable use of natural resources (IUCN, 1972). The IUCN has closely collaborated with UNESCO to promote nature conservation on a global scale.

The network defined Environmental Education (EE) as the process of recognising values and clarifying concepts to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings. EE also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality (IUCN, 1972:70). This alludes to organised efforts to educate individuals about how the natural environment operates as a system, especially on how mankind should formulate a code of behaviour as a means of improving environmental quality (Kamara, 2016). UNESCO (2014) further states that EE is crucial in imparting deep-rooted respect for nature amongst civil society for the reason of enhancing environmental awareness. In 1972, the Stockholm Conference on the Human Environment, held in Stockholm, Sweden, placed environmental issues at the forefront of international governance and cooperation (UNESCO, Stockholm, 1972). Subsequently, the United Nations Environment Programme (UNEP) was formulated as a direct outcome of the Stockholm Declaration; therefore, UNESCO-UNEP has jointly championed the International Environmental Education Programme (IEEP) (1975-1995), promoting global EE, awareness and responsibility.

Following the Stockholm Conference, the International Workshop on EE hosted in Belgrade, Yugoslavia (now Serbia) in 1975 urged nations to integrate EE into the school

curriculum (UNESCO, 1975). The long-standing UNESCO-UNEP partnership on EE, and later Education for Sustainable Development (ESD), resulted in major intergovernmental conferences; these include the First Intergovernmental Conference on EE in Tbilisi, Georgia, of 1977; the International Strategy for Action in the Field of EE and Training in Moscow of 1987; and the Environment and Society: Education and Public Awareness for Sustainability Conference in Thessaloniki, Greece, of 1997. Collectively, these meetings developed global strategies, promoted public awareness, and emphasised the critical role of EE as a foundation of sustainable development efforts (Gough and Gough, 2015; UN, 2010).

However, it was the World Conservation Strategy (1980) which played a key role in shaping the concept of 'Sustainable Development' supported by the International Union for Conservation of Nature and Natural Resources, the United Nations Environment Programme, and the World Wild Fund (IUCN-UNEP-WWF, 1980). In 1987, the United Nations World Commission on the Environment and Development (WCED), in its report *Our Common Future* (also known as the Brundtland Report), advanced citizens' understanding of interdependence and the interrelationship between economies and the environment (WCED, 1987; UNEP-IUCN-WWF, 1991). The report defined Sustainable Development (SD) as the development that fulfils present generation needs without jeopardising the needs of the future generations (UN, 1987).

After 5 years, the United Nations Conference on Environmental and Development (UNCED) of 1992 (also referred to as the Earth Summit), held in Rio de Janeiro, introduced Agenda 21 and the Rio Declaration on Environment and Development as a cornerstone to integrated sustainability approaches (UN, 1993). At the end of Rio-92, the Climate and Biodiversity Conventions and the Declaration of Principles for Forests were signed and adopted as global environmental agreements (Umberto *et al.*, 1997). For this reason, in 1997, the Rio +5 conference took place – it was the first in-depth progress review to evaluate efforts made at the Rio-92 agreements. A decade later, the 2002 Johannesburg World Summit on Sustainable Development (nicknamed Rio +10) took place in Johannesburg, South Africa, to emphasise the global commitment to SD (UN,

2002). This summit introduced the Johannesburg Plan of Implementation, aimed at addressing environmental issues such as water, energy, health, agriculture, and biodiversity. Additionally, several other World Summits were held by the United Nations in New York; these include the World Summits of 2005, 2008 and 2010. These summits made notable progress; however, stakeholders were required to reinforce their effort and take urgent action to fulfil the Millennium Development Goals (MDG) (UN, 2000; UN, 2005; UN, 2010).

Twenty years after the World Summit of 1992, the 2012 Sustainable Development Summit (also termed Rio+20) was held in Rio de Janeiro. Member states initiated a global process to implement and agreed to reconvene for a high-level summit in September 2015 to adopt new Sustainable Development Goals (SDG) in order to build on the foundation set by the Millennium Development Goals (UN, 2012). Indeed, global leaders gathered at the United Nations in New York and adopted a plan called Transforming Our World: The 2030 Agenda for Sustainable Development by 2030 (UN, 2015a), including a declaration, with 17 Sustainable Development Goals and 169 targets. Two months later, world leaders signed the Paris Agreement at the 2015 Paris Climate Conference (widely known as COP21), committing to decisive global action on climate change. This convention called for effort to limit global temperatures to 2 degrees Celsius compared to pre-industrial levels (Damoah, 2022; UN, 2015a; Stallard, 2022). To strengthen earlier international declarations, the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) took place in the Egyptian coastal city of Sharm el-Sheikh (UN, 2015b). The convention resolved to operationalise a loss and damage fund to support disadvantaged countries in addressing the unfavourable impacts of climate change.

1.2.3 Local Response to Environmental Crisis

Across sub-Saharan Africa, countries such as South Africa, signatory in international conventions, responded by formulating policy documents that advocate for the implementation of EE in the school curriculum in all subjects and grades from Grade R to Grade 12 (Phillips, 2022). South Africa's efforts in implementing EE date back to the

Environmental Education Association of Southern Africa (EEASA), founded in 1982 (Dlamini, 2018), because of the interaction between educationalists and environmentalists. Before 1994, South Africa was motivated by the Belgrade Charter as well as the Tbilisi Declaration to tackle issues of EE (Mbokazi, 2016). The focus was on the natural resources, with socio-political issues often excluded (Songqwaru, 2012), hence the promulgation of the Environment Conservation Act (73 of 1989). By the year 1992, an Environmental Education Policy Initiative (EEPI) was chartered to facilitate the process and the development of EE strategies for schools (Damoah and Omodan, 2022).

Post 1994, the White Paper on Education and Training, published in 1995, introduced the first attempt to institutionalise EE by creating environmentally literate and active citizens (DoE, 1995; Loubster, 2014). This policy document aligned education with the goals of the Reconstruction and Development Programme (RDP) that aimed to redress socio-economic disparities stemming from the apartheid regime (RDP, 1994). In 1996, the right to a clean environment was enshrined in the Constitution of South Africa (RSA, 1996), and the country was integrated into the world economy with the expectation to operate as a globally responsible country and had a growing obligation to meet international commitments (Makgae, 2011).

The advent of democracy in South Africa brought several educational transformations; these include outcome-based education like Curriculum 2005 enacted in 1998 (Keswa, 2020), which resulted in the Revised National Curriculum Statement (RNCS) of 2002, the National Curriculum Statement (NCS) of 2006, and the Curriculum Assessment and Policy Statement (CAPS) adopted in 2012 (Pillay, 2014). These policy documents include a number of key statements, and one of them reads, "human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa" (DoE, 2011:5). These curriculum changes were expected to address past inequalities and the poor state of the environment (Matsekoleng, 2017). Additionally, CAPS reiterated Chapter One of the National Environmental Management Act (NEMA) of 1998, which seeks community empowerment through EE and awareness, SD, knowledge

sharing and other experiences (RSA, 1998). This act was legislated by the Department of Forestry, Fisheries and Environment (formerly known as the Department of Environmental Affairs and Tourism [DEAT]) as mandated by the government.

However, like other developing countries, EE in South Africa often remains marginalised and a topic of concern (Dreyer and Loubster, 2014). This is echoed by Togo *et al.* (2015), who noted that despite EE being well covered in policy documents, not much has been achieved in translating this into curriculum and teaching. Therefore, it is significant to conduct studies that evaluate the implementation of waste awareness programmes in the curriculum among secondary school learners from time to time. Previous research has demonstrated that EE plays a significant role in raising awareness about waste (Yusuf and Fajri, 2022). Hence, this study seeks to evaluate the implementation of waste awareness programmes in the curriculum in urban and rural public secondary schools in the Pinetown District, eThekweni Municipality, South Africa.

1.3 STATEMENT OF THE RESEARCH PROBLEM

Over the past decades, South Africa has seen the emergence of various existing government initiatives aimed at giving formal recognition to environmental context in the education system. These initiatives include the Environmental Education Policy Initiative, such as the Reconstruction Development Programme (RDP) of 1994, NEMA (1998), and CAPS (2012), which informed EE to be taught as a cross-curricular discipline (Makokotlela, 2016); and the National Environmental Education Programme (NEEP), which pioneered the practical implementation and support of EE, such as the Wildlife and Environment Society of South Africa (WESSA) Eco-school programme, which began in 2003 (Ryan, 2017). From a local perspective, initiatives like the Waste Management Education Programme have been established to address environmental challenges, with a particular focus on waste reduction (eThekweni Municipality, n.d.). This initiative is led by the Waste Minimisation Division of eThekweni Municipality, formerly known as Durban Solid Waste (DSW) (incorporating the Keep Durban Beautiful Association – KDBA), in partnership with the KwaZulu-Natal Department of Education as part of its local environmental mandate. The eThekweni Municipality also initiated a school beautification

competition in partnership with the provincial Department of Agriculture and Environmental Affairs (DAEA) and the eThekweni Municipality's Department of Health (DoH), and WESSA for the past 25 years (Baillache, 2015; Baillache, 2017). The ongoing competition is aimed at educating communities and schools (principals, teachers and learners) about the importance of low-impact living and promoting a litter-free environment (Mkhize and Nyandeni, 2011).

Such initiatives signify a crucial role played by schools in the success or failure of EE, as young people are most receptive to global challenges and thus prepared to address urgent problems the world is facing today. This demonstrates learners' ability to comprehend the implications of their actions on the environment and provide solutions, provided they are properly taught and supported (Shutaleva *et al.*, 2022). Additionally, Lekgeu *et al.* (2017) argued that secondary school learners are recognised as future decision makers who will formulate environmental policies, legislation, and applicable practices, and thus serve as agents of change. Therefore, they must be equipped with quality education to realise the desired result of sustainability.

However, despite various government-mandated policy initiatives and educational programmes intended to redress past educational injustice by including it in the school curriculum across all subjects from primary to secondary level, significant gaps still exist (Benjamin and Adu, 2019; Akombelwa, 2018). As realised that majority of the learners in the eThekweni Municipality under Pinetown District secondary schools lack basic knowledge of environmental awareness and sustainable practices. This is evident by the littering episodes observed in the internal and external environment of school premises as well as the non-existence of participation in environmental campaigns, especially those related to waste management such as reusing, recycling, and composting. These observations support the view that the curriculum transformations seem to have a minimal impact on learners' environmental awareness; for example, littering continues to be a growing problem in South Africa, both in the home and school environment (Matsekoleng, 2017:2). Such findings are regrettable, given the large amount of waste in South African schools generated through littering, which degrades the environment (Msezane and

Mudau, 2014). In agreement, a study by Msezane (2017) revealed that learners showed no concern about the negative impact of littering in school grounds and surrounding areas even after extra-mural activities were initiated to reduce littering. Based on the above problem statement, the intended study is an attempt to evaluate the implementation of waste awareness programmes into the curriculum in urban and rural public secondary schools under Pinetown District, at eThekweni Municipality, South Africa.

1.4 JUSTIFICATION OF THE STUDY

The researcher's interest in undertaking this study was triggered by the observation that led to the assumption that the manner in which EE is taught in schools is flawed. Poor waste management practices are still prevalent in schools and communities around Pinetown District. When the Department of Education (DoE, 2016) presented the national curriculum strategy, the main objective was to ensure that learners gain knowledge and apply it to better their lives. The goal implied that the course of study should contribute to knowledge in local contexts by incorporating EE in every subject learned in schools (Msezane, 2017). To help learners build individual capacity through active participation in environmental conservation and develop a sustainable mindset, educators must effectively communicate the principles of sustainability (Damoah and Omodan, 2022; Zaleniene and Pereira, 2021).

To bring this strategy to fruition, the government mandated the Department of Forestry, Fisheries, and the Environment (DFFE) to manage, safeguard, and care for South Africa's dwindling natural resources and overall environment while promoting sustainable development (DFFE, 2020). Among the various policy strategies developed by the DFFE, one notable example is the National Waste Management Strategy of 2011, which is a legislative provision of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (DEA, 2011). This statement had set an objective to promote waste minimisation, reuse, recycling, and recovery (Goal 1), through the short-term (5-year) targets of reducing landfill waste by 25% through these practices and ensuring that all municipalities implement waste separation at source for residents (DEA, 2011). Furthermore, the strategy had set out Goal 4 to ensure that people are aware of the

impact of waste on their health, well-being, and the environment. Its five-year targets aimed for 80% of municipalities to run local awareness campaigns and 80% of schools to implement waste awareness programmes.

The main objective was to raise awareness about waste issues and integrate empirical waste projects into the education system, such as recycling and litter control. In 2020, the DFFE reported a 100% of the targeted schools implemented waste awareness programmes (DFFE, 2020). Be that as it may, it is pivotal to remark that while the efforts and commendable changes made in South Africa's education system cannot be disputed, the proponents often make exaggerated claims, as these statements are unverified by independent academics. Moreover, Signe (2015) noted that regardless of significant strides made in the development of waste management policies and the regulatory environment, practical implementation lags behind policy intent. The overarching question, therefore, becomes why are South African schools indicating a lack of information and awareness about waste management when there is a plethora of legislative frameworks that promote the implementation of EE? To address the question, this study seeks to evaluate the implementation of waste awareness programs in the curriculum in urban and rural public secondary schools under Pinetown District, eThekweni Municipality, South Africa.

1.5 RESEARCH AIM, OBJECTIVES, AND RESEARCH QUESTIONS

This section provides a structured research aim for investigating the topic, outlines specific research objectives, and presents the guiding research questions.

1.5.1 Research Aim

The aim of the study was to evaluate the implementation of waste awareness programmes into the curriculum under Pinetown District secondary schools, at eThekweni Municipality, South Africa.

1.5.2 Research Objectives

- To determine if waste management and awareness is part of the school curriculum
- To determine if waste management awareness campaigns/projects have been hosted before in schools.
- To evaluate the level of waste management awareness in schools.
- To evaluate waste management facilities in schools under Pinetown District.
- To identify challenges of implementing waste awareness programmes in Pinetown District.

1.5.3 Research Questions

- Is waste management and awareness part of the school curriculum?
- Have waste management awareness campaigns/events/projects been hosted in the schools before?
- What is the level of waste management awareness in schools?
- Do schools around Pinetown District have waste management facilities?
- What are the challenges of implementing waste awareness programmes?

1.6 SIGNIFICANCE OF THE RESEARCH RESULTS

It has been established by various studies that waste is an unavoidable after-effect of most human activities (Periathamby, 2011; Nkosi *et al.*, 2014; Brunner and Rechberger, 2014; Adeniran *et al.*, 2022). Thereby, all members of civil society must play a role in providing solutions to reduce pollution and waste. This is especially because the environment, through its configuration and nature, dictates the wellbeing of its inhabitants (Nkala, 2012). In other words, the report clarifies the fact that human survival relies on their ability to adapt to their environment and how they interact with the environment. Furthermore, the government acknowledged the importance of scientific research aimed at educating citizens on pollution and waste management issues (DEAT, 2000). The researcher became interested in conducting the study, which seeks to evaluate the implementation of waste awareness programmes in the curriculum of urban and rural public secondary schools in the Pinetown District.

With that said, this research aims to raise awareness about waste as an environmental problem, the negative impacts thereof, the importance of including waste as a topic in the school curriculum, and possible solutions to manage waste in an eco-friendly manner in order to achieve sustainability. Moreover, it is envisaged that the research findings would provide baseline information and suitable strategies that facilitate the implementation of waste awareness programmes into the school curriculum in Pinetown District. The information from this study can assist in identifying problem areas that need attention, resources, or improvement. Moreover, the information from the study can assist in breaking down existing behaviours and expanding recycling programmes where applicable. The biggest challenge facing the government is to focus on and include the people on the grassroot level that are affected by these policies and decisions. Therefore, conducting this research study would emphasise and promote the benefits of integrating waste awareness programmes in the school curriculum and encourage the practice of waste hierarchy, especially recycling and separation at source. This study can also serve as a cornerstone for Pinetown District schools to participate in recycling projects. Furthermore, the data recorded from this research could assist the Pinetown District to create healthy competition between schools, where the best-performing schools can be given incentives such as bursaries awarded to matric students, computers for the schools, and/or a free visit to a recycling centre to learn more about waste. Lastly, the study results can be used to inform future studies that plan on focusing on assessing the implementation of waste awareness programmes into the school curriculum.

1.7 STUDY LIMITATIONS AND ASSUMPTIONS

Limitation refers to study constraints due to theoretical or procedural reasons, which could potentially threaten the authenticity and generalisation of the research findings (Patidar, 2013).

- The research findings of this study cannot be generalised for all public South African schools in all nine provinces because this study investigated the implementation of waste awareness programmes under Pinetown District

secondary schools in South Africa. Therefore, this study was limited to learners in Grades 9 and 12 and teachers.

Assumption refers to a statement viewed as credible based on logic or reasons but without proof or verification (Patidar, 2013).

- This study assumed participants' responses as truthful and factual because their identities were concealed. Respondents were not asked for personal information that could identify or link them to the data.
- This study assumed that the instruments used, namely questionnaires and interviews, would elicit or measure reliable results, as matters of reliability and validity were adhered to.

1.8 CHAPTER OUTLINE

CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

This chapter provides an introductory overview of the study by defining the global environmental crisis and offering a brief historical account of international and local responses to it. It then presents the research problem and gives justification for the study. This chapter also provides a structured research aim and outlines specific objectives and guiding research questions. Lastly, this chapter discusses the significance of the research findings and addresses the study's limitations and underlying assumptions.

CHAPTER TWO: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

This chapter reviews literature through theoretical and conceptual frameworks and examines how learners develop environmental understanding and how education policies align with practice. It covers themes like learning theories, curriculum, policy implementation, stakeholder roles, and challenges, using narrative synthesis and relevant studies.

CHAPTER THREE: RESEARCH METHODOLOGY

This chapter discusses the system of methods used when this study was conducted. A description of the study area with a study area map is provided; the research design relevant to this study and the data collection methods employed are clearly justified; population and sampling processes are described; ethical issues are given attention; and lastly, the proposed method(s) of data analysis are presented.

CHAPTER FOUR: PRESENTATION OF THE RESULTS, INTERPRETATION AND DISCUSSION

This chapter displays the findings of the research. This was achieved through interpretative quantitative data analysis, including charts, percentages, and tables, as well as qualitative data analysis, including summaries of words, phrases, and sentences to find patterns to draw conclusions in relation to research questions.

CHAPTER FIVE: RECOMMENDATION AND CONCLUSION

This chapter details the conclusion drawn from the findings gathered in this study. This chapter provides a synopsis of the research, concluding findings, and recommendations for the study.

1.9 CHAPTER SUMMARY

This chapter introduced the global environmental crisis, establishing a foundational understanding of the study's central concern. It then outlines the contextual background of the research, providing information on broader issues that inform the investigation. A clear, scientifically grounded and unbiased problem statement follows, articulating the specific focus of the inquiry. The chapter proceeds to justify the relevance of the study through engagement with recent and pertinent literature. It also presents the research aim, objectives, and guiding questions in a structured format. Finally, it discusses the anticipated significance of the findings, along with the study's inherent limitations and underlying assumptions, as well as a detailed chapter outline.

CHAPTER TWO: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a review informed by both a theoretical framework and a conceptual framework. The theoretical framework outlined major learning theories, including Behaviourism, Social Learning Theory, Cognitive Theory, and Constructivism, to describe how learners gain environmental knowledge, attitudes, and behaviours. The conceptual framework defines and links key concepts such as EE, curriculum integration, policy framework and school-based initiatives. It provides a lens through which the study examines the alignment between policy intentions and practical implementation; it further highlights the importance of EE and outlines the challenges of EE within the school contexts. These frameworks guide the structure of the literature review, which is organised into topic-theme sections covering pedagogical approaches, EE policy, curriculum transformation, stakeholder roles, challenges of EE and waste awareness. This chapter also discusses a strategic approach to literature synthesis, including narrative review techniques that outline existing research articles related to the study.

2.2 THEORETICAL FRAMEWORK

According to Adom *et al.* (2018) and Hassan (2024), a theoretical framework is a structured synthesis that links the research study to established concepts, theories, or models derived from existing literature. In simpler terms, it offers the theoretical framework necessary to understand, contextualise, and explain the meaning embedded in the study's findings, providing a foundational lens through which research data is analysed and interpreted (Kivunja, 2018; Van der Waladt, 2025). Additionally, a theoretical framework encompasses various levels of theory and provides a structured model through which 'the results of a study can be interpreted when situating the results within the broader existing body of knowledge and indicating any similarities, contradictions, silences and new insights' (Maree, 2012:34). Therefore, a theoretical framework serves as a preliminary review of existing theories, defining a roadmap for developing the

premises, assumptions, and arguments that underpin a research study, making it a cornerstone of scholarly inquiry.

To objectively inform the evaluation of how waste awareness programmes are implemented and internalised in Pinetown District secondary schools, the study is theoretically grounded in multiple educational learning frameworks that integrate Behaviourism, Social Cognitive, and Constructivism Learning Theory. Learning theories refer to basic principles that explain how learners acquire, retain, and recall new knowledge as well as skills across various contexts (Giannoukos, 2024). These learning theories were identified as relevant for this study because each offers valuable contributions toward a deeper understanding of the phenomena being investigated. Behavioural Learning Theory (BLT) is centred on observable and measurable characteristics of human behaviour, external stimuli and consequences in shaping behaviour (Zhou and Brown, 2015). For instance, John B. Watson (1878-1958) believed the use of positive reinforcement can promote desirable behaviours and contribute to a positive learning environment. Social Learning Theory (SLT), introduced by Albert Bandura (1977), proposed that gaining knowledge occurs through observing others, imitating and/or modelling their actions (Cherry, 2024; Hammer, 2011). Additionally, SLT highlights important factors like attention, motivation, attitudes, and emotions.

Because it usually considered a conceptual bridge between behaviourism (traditional learning theory) and Cognitive Theory, where Behaviourism emphasises observable changes in behaviour, generally shaped through reinforcement and repetition – an approach closely associated with memorisation learning (Rumjaun and Narod, 2020). On the other hand, Cognitive Theory focuses on the internal mental processes that support learning, like perception, memory, and reasoning. As a result, SLT, includes elements of both, indicating that individuals learn not only through direct experience but also by observing others and forming expectations based on those observations. Finally, Constructivist Learning Theory, developed by Lev Vygotsky (1978) and Jean Piaget (1950), emphasises the active role of learners in constructing knowledge, such as hands-on exploration, practical experiments, and meaningful social interactions (Tracey and

Morrow, 2017). In simple term, Constructivism learning materialises through understanding new information and integrating it into existing knowledge structures and adopting these mental models to fit new experiences. This integrative standpoint is particularly relevant to evaluating how waste awareness programmes are implemented and internalised in school environments, where both behavioural reinforcement and cognitive engagement play critical roles.

2.3 CONCEPTUAL LITERATURE REVIEW

Conceptual research generally entails an in-depth examination of existing literature to understand how abstract thoughts have been defined and investigated by previous scholars (Efuntade *et al.*, 2024). This process helps identify the problem, suitable theories, methods, and interpreting findings (Ravitch and Riggan, 2017). It also links all the parts of the research process, deciding how the study is set up and carried out. This adds to knowledge by finding gaps, similarities, and differences, as well as chances for more research in the future (Ravitch and Riggan, 2017; Efuntade *et al.*, 2024).

2.3.1 The Concept of Environmental Education

Over the years, the concept of EE has undergone several significant transformations. During the 1970s, EE was mainly focused on educating citizens about global environmental issues such as air and water pollution, population growth and depletion of natural resources. This was achieved through knowledge and information transference (Olatunde-Aiyedun, 2021). The term 'EE' has been described in various ways; one such definition describes EE as the interrelationships between living organisms, the environment, and all factors that impact the biosphere, including atmospheric conditions, food chains, and the water cycle (Poonguzhali, 2021). However, the early definition of EE was coined by IUCN (IUCN, 1972) as fostering values, refining concepts, and improving skills that aid individuals in understanding the connection between people, culture, and nature, while promoting measured actions and sustainable behaviour. EE is a versatile integrative field, including disciplines such as Chemistry, Physics, Life Science, Medical Science, Agriculture, Public Health, Sanitary Engineering, Geography, Geology, and

Atmospheric Science (Sathya, 2022). It can be delivered through formal and informal learning platforms, starting from primary to post-secondary levels.

2.3.1.1 Goals and Objectives of Environmental Education

Environmental education aims to achieve a range of goals and objectives that promote environmental consciousness, understanding, and responsible action.

According to UNESCO (1977), EE goals include:

- To raise environmental awareness concerning economic, social, political, and environmental challenges in rural and urban citizens.
- To ensure everyone has access to knowledge, values, attitudes, commitment, and skills required to safeguard and enhance the environment.
- To instil new patterns of behaviour in people towards the environment.

The objectives of EE include:

- Awareness and responsiveness to the environment system and environmental challenges.
- Knowledge and experience of the environment system and its associated problems.
- Positive attitudes and concern for the environment and motive to actively participate in environmental protection.
- Skills and competency to identify and resolve environmental issues.
- Participation in active roles that lead to resolution of environmental issues.

2.3.2 Historical Overview of Environmental Education and Waste Programmes Conferences

2.3.2.1 The International Union for the Conservation of Nature and Natural Resources

Environmental education and awareness dates to the beginning of the first global environmental union called the International Union for Conservation of Nature and Natural

Resources, which was established in 1948 in Fontainebleau, France (Britannica, 2023). The IUCN was focused on conserving the diverse ecosystem through sustainable use of natural resources, and in 1961 the World Wildlife Fund (WWF) was established to finance and cover operational expenses. In 1971, emphasis was given to the concept of EE due to the symbolic relationship between IUCN and UNESCO. This was evident when IUCN participated in preparations for the United Nations Conference on the Human Environment (UNESCO, Stockholm, 1972). The 1970s presented prolific growth in EE, as UNESCO-UNEP drafted statements that shaped its development and addressed major concerns (Eneji *et al.*, 2017); these include the Stockholm Declaration (1972), the Belgrade Charter conference (1975), the Tbilisi Declaration conference (1977), and the Thessaloniki Declaration (1997).

2.3.2.2 The Stockholm Declaration

EE became widely recognised when the United Nations Conference on the Human Environment held in Stockholm, Sweden, in 1972 called on humanity to safeguard and enhance the environment (UNESCO, Stockholm, 1972; Kamara, 2016). This statement document compiled and produced 7 proclamations and twenty-six principles, to which principle nineteen calls for 'education in environmental issues for the youth and adults while considering the disadvantaged' (UNESCO, Stockholm, 1972: 5). This conference also provided an action plan of one hundred and nine recommendations, resulting in the creation of the UNEP, which laid the foundation for future global environmental governance (Mbokazi, 2016). Despite strong intentions, failure to implement most of its action principles prompted the UNESCO to hold follow-up conferences.

2.3.2.3 The Belgrade Charter

Although the Stockholm conference set the tone for global awareness, it can never be disputed that the Belgrade Charter was an epitome in which EE strove internationally. As a result, Recommendation 96 was addressed at the International Workshop on EE hosted in Belgrade, Yugoslavia (now Serbia), in 1975. The Charter presented goals, objectives and guiding principles for EE programmes and specified audience categories such as

formal education (from pre-primary to higher education, teachers and training environmental professionals) and non-formal education (youth, adults, government and non-government bodies) (UNESCO, 1975). Earlier that year, UNESCO-UNEP also initiated the IEEP in response to recommendation 96, 'designed to promote reflection and action, as well as international cooperation in the field of EE' (UNESCO, 1984:2). In simple language, the IEEP served as a clearinghouse for a progressive model of pedagogical practices at EE (Dorn, 2020).

2.3.2.4 The Tbilisi Declaration

In 1977, UNESCO-UNEP hosted the intergovernmental convention on EE in Tbilisi, Georgia. The representatives at this gathering unanimously agreed on the significant role played by EE in safeguarding and improving the environment while maintaining a sound and balanced advancement of the global community (Savant, 2022; UNESCO, Tbilisi, 1977). This conference expanded and revised the aims, objectives, characteristics and standards from the Stockholm Declaration and the Belgrade Charter.

2.3.2.5 The World Conservation Strategy

After three years, the IUCN, with the advice, cooperation and financial assistance of UNEP and WWF, published a World Conservation Strategy (WCS) in Gland, Switzerland, in 1980. The strategy presented policy guidance on conservation efforts and introduced the term 'Sustainable Development' by preserving living natural resources (IUCN-UNEP-WWF, 1980). The strategy also highlighted three main groups to help advance the achievement of SD, including government policymakers and advisers; conservationists and professionals working with living resources; and development practitioners like agencies, businesses, the commercial sector and union trades.

2.3.2.6 The Brundtland Report

The year 1987 saw the landmark World Commission on Environment and Development (WCED) publish the Brundtland Report, which described the concept of SD (Jarvie, 2016). The report popularised the definition of SD as "development that meets the needs

of the present without compromising the ability of future generations to meet their own needs" (UN, 1987:37) and discussed numerous ways to implement a sustainable future (UN, 2018). This paper laid an important foundation for the Earth Summit, held in Rio de Janeiro in 1992 (StatsSA, 2018).

2.3.2.7 The Moscow Conference

In the same year, the proceedings of the International Congress on EEAT led by UNESCO-UNEP took place from 17 to 21 August 1987 (Smyth, 1987). The conference featured key discussions from the general assembly, delegation, and five symposia focused on advancing EE, with topics including EE teacher training; EE integration into higher education curricula; specialised EE programmes; global environmental challenges; SD; communication operations; the role of biosphere reserves and other protected areas; and the contribution of NGOs to the development of EE and training.

2.3.2.8 The Earth Summit

The United Nations Conference on Environmental and Development (UNCED) of 1992, prominently cited as the Earth Summit held in Rio de Janeiro, Brazil, marked a historical shift in the awareness of environmental issues and consolidated the global advancement in relation to SD, which was introduced and published by WCED in 1987 (Barcena *et al.*, 2012). This conference adopted various nonbinding documents, including Local Agenda 21 (UNCED, 1992a; Drexhage and Murphy, 2010), comprised of 40 chapters designed for adoption by spheres of government at the international, national, and local levels to address human impact on the environment (UNCED, 1992b). Chapter 36 realised education as instrumental in fostering SD and strengthening people's capacity to tackle environmental and development challenges. The publication also emphasised integrating ESD in the schooling system across the world (Kopnina, 2011). Additionally, the document recognised waste as an underlying issue, either as a cause of environmental problems or as an outcome of human activities (Srinivas, n.d.). Chapter 21 specifically discussed waste-related problems and presented a blueprint for promoting SD (Kidd, 2011), focusing on four major waste-related areas: minimising waste, maximising waste reuse

and recycling, promoting environmentally sound disposal and treatment, and expanding the reach of waste services (Chaves *et al.*, 2014).

2.3.2.9 The Thessaloniki

In 1997, the Greek government joined forces with UNESCO and organised the International Conference on Environment and Society: Education and Public Awareness for Sustainability in Thessaloniki (UNESCO-EPD, 1997). This declaration noted the recommendation, strategies, and the valid existence of the Belgrade Charter, the Tbilisi Declaration, and the Earth Summit. It was also noted that these conferences were not fully explored and the progress made after the Earth Summit was insufficient (UNESCO-EPD, 1997). Furthermore, the Thessaloniki declaration was built upon the Earth Summit and focused on ESD to the extent of excluding the term EE in the final declaration (Rodrigues and Arenas, 2022).

2.3.2.10 World Summit on Sustainable Development (WSSD)

The second World Summit on Sustainable Development (WSSD) was assembled in 2002 at the Sandton Convention Centre in Johannesburg, South Africa, to reaffirm the global commitment to SD and the implementation thereof. This summit adopted two resolutions: the Johannesburg Declaration on Sustainable Development and the Implementation Plan of the World on Sustainable Development (UN, 2002). The political resolution identified challenges, reaffirmed commitment to SD by reviewing the Agenda 21 document and emphasised the need for multilateral implementation. In contrast, the Plan of Implementation outlined specific timelines for addressing certain issues. Like Agenda 21, the WSSD addressed waste in Chapter three, with Principle fifteen (d) promoting awareness through education and media, particularly among youth, while Principle twenty (a) and (b) advocates for waste prevention, minimisation, reuse, recycling, and eco-friendly materials (UN, 2002). Moreover, the UN hosted World Summits in 2005, 2008, and 2010 to advance global development but called for stronger, immediate action to meet the MDG.

2.3.2.11 World Summit on Sustainable Development (WSSD)

At the third Earth Summit held in Rio de Janeiro in 2012 (Rio+20), participating nations reaffirmed allegiance made at the 2002 WSSD, with the intention of assessing progress, discussing emerging issues and forging new implementation strategies (DEA, 2012). The UN declared 2005-2014 as the decade for ESD (Wals, 2013). As a result, many researchers believed EE and ESD were interrelated, therefore positioning EE as a bridge to sustainability (Braus *et al.*, 2022). The Rio+20 Summit of 2012 initiated a global process that resulted in the adoption of the 2030 Agenda with 17 SDGs at the High-level Summit in September 2015 (UN, 2012; UN, 2016). That same year, world leaders endorsed the landmark plan ‘Transforming Our World: The 2030 Agenda for Sustainable Development by 2030’ and signed the Paris Agreement at COP21 (UN, 2015a). More recently, COP27 in 2022 established a climate reparation fund in Sharm el-Sheikh, Egypt.”

2.3.3 International Legislation on Environmental Education and Waste Programmes

2.3.3.1 United States: Environmental Education Policy for Schools

Various counties and governments have taken active measures to develop EE policies and practices to be implemented in schools (Govender, 2011). The United States, as one of the most influential stakeholders and principal supporters of the United Nations, enacted the National Environmental Education Act (NEEA) of 1990, which mandates the Environmental Protection Agency (EPA) to offer global leadership aimed at advancing environmental literacy (NEEA, 1990). The primary objectives of the Office of EE under the EPA, include formulating and implementing the curricula and training programmes for learners and teachers (Fasolya, 2016). Additionally, EPA also organises seminars, conferences, and discussion forums to address persisting environmental concerns in collaboration with State Departments of Education and other relevant agencies.

2.3.3.2 Australia: Environmental Education Policy for Schools

EE policies in Australia rose to prominence when the 1970 – Education and the Environmental Crisis conference in Canberra and the 1975 – Pre-UNESCO Conference in Melbourne were held in preparation for the UNESCO's Tbilisi conference, helping Australians set the stage for coordinated educational responses (Fien and Ferreira, 1997). In 1980, Australia's National Conservation Strategy, which originated from the World Conservation Strategy, emphasised EE and sustainable resource management in schools (Gough, 2001). As a partial response to the Brundtland Report "*Our Common Future*", national initiatives have contextualised Australia's policy frameworks and practices (Cao, 2020). Consequently, the Hobart Declaration of 1989 set national goals for school education, promoting environmental understanding and ethical judgement – further embedding EE into policy frameworks (Properjohn *et al.*, 2024; Fien and Ferreira, 1997).

Influenced by Agenda 21 and the 2002 Johannesburg Summit on SD (Tilbury, 2004), Australian Education Ministers of the States formulated the EE for a Sustainable Future: National Action Plan of 2000 (Tilbury, 2006). The National Action Plan presented a coordinated approach with sustainability principles, formal and informal education, further and higher education, and aligning with the transformative goals of ESD (Department of the Environment and Heritage, 2000). The national plan resulted in three frameworks: the National Environmental Education Council of July 2000 (NEEC)—now the National Council on Education for Sustainability; the National Environmental Education Network of May 2001 (NEEN); and the Australian Research Institute in Education for Sustainability of Dec 2003 (ARIES) (DEWHA, 2009). These frameworks integrated EE objectives through mandated syllabuses like Human Society and Science and Technology in Grades R-6 (NSW-DET, 2001). In Grades 7–10, subjects like Science, Geography, Personal Development, Health and Physical Education, and Design and Technology further reinforced environmental learning.

2.3.3.3 United Kingdom: Environmental Education Policy for Schools

The historical development of EE policies in the United Kingdom (UK) extends back to the legacy of the Industrial Revolution; during the 18th and 19th centuries, there was a dramatic rise in waste generation due to economic recovery and high consumerism (Green Living Reporter, 2025). These challenges fostered early environmental awareness, with sustainable waste management efforts emerging in the 19th and 20th centuries. Consequently, the term 'EE' in the UK was first heard at a 1965 conference at the University of Keele (Gough, 2016). Early initiatives include the School Nature Study Union of 1902, the founding of the National Association for Environmental Education (NAEE) of 1971 (Palmer, 2002), and the Field Studies Council and Nature Conservancy, promoting outdoor learning and framing EE as a multidisciplinary blend of Geography, History, and Natural Sciences. The meeting of educationalists and conservationists in July 1968 led to the development of the Council for Environmental Education (CEE) (UNESCO-IUCN, 1970).

The Department for Education 2022 introduced its Sustainability and Climate Change Strategy as a cross-curricular theme, covering climate education, green skills, infrastructure, operations and supply chain, and international collaboration (DfE, 2022; NAEE, 2024). Each country in the UK is responsible for setting their own policy; as a result, Scotland and Wales place a stronger emphasis on sustainability education compared to England and Northern Ireland (UNESCO, 2013). Scotland embedded sustainability through the Scottish Schools Environment Research Centre, and Wales advanced reforms in 2022 guided by the Well-being of Future Generations Act of 2015 (LCWG, 2022). Northern Ireland's statutory curriculum integrated environment and society, aiming to empower young people to contribute positively to the economy, environment, and sustainable development (CCEA, n.d.).

2.3.3.4 Brazil: Environmental Education Policy for Schools

Brazil is amongst the nations that have implemented public EE policies, resulting from a historical sequence of international proposals and endeavours. Since the 1980s,

transformative and critical branches of EE have achieved visibility across several states (Thiemann *et al.*, 2018). During the 1990s, multiple EE legislations were enacted; these include the Law of Directives and Bases of National Education (LDB no. 9394/1996), the National Curriculum Parameters (PCN, Resolution CEB no. 03/1998), and the National Policy for Environmental Education (PNEA; Act 9795/1999) (Cararo *et al.*, 2022). The PCN (1998) integrated the Tbilisi conference objectives through a transcribed excerpt, reinforcing Brazil's commitment to internationally guided EE (Ministry of Education, 1998). The PNEA implemented EE across all levels of formal and non-formal education and established the National Environmental System (Sisnama) (Brazil, 1981). Additionally, the 1988 Brazilian Constitution (Article 225, item VI) mandates the integration of EE into the curriculum to advance public awareness for the preservation of the environment (dos Santos *et al.*, 2020). From 2000 onwards, Brazil promoted EE through National Education Guidelines and Framework Law, which made EE mandatory in all subjects, and the National Environmental Education Program (ProNEA, Act 9795/99) was created in 2003, with updates published in 2005, 2014 and 2018 (Cararo *et al.*, 2022). However, the Provisionary Measure no. 746 revoked this mandatory inclusion in 2016, leading to the annulment of consolidated programmes such as the National Education Plan 2014-2024 (PNE, Law no. 13.005/2014) and the National Common Curriculum Base (BNCC, Resolution CNE/CP no. 2/2017) (Frizzo and Carvalho, 2018, Silva and Loureiro, 2020).

2.3.3.5 Philippines: Environmental Education Policy for Schools

To advance the relationship between man and the environment, the Presidential Decree No. 356 of 1975 implemented key legislation: the Sanitation Code, the Marine Pollution Law of 1976 (PD 979, 1976), and the Water Code (PD 1067, 1976) (Manila, 1975; Manila, 1976; Republic of the Philippines, 2014). The Sanitation Code emphasised the rules and regulations of hazardous waste, while the Pollution Control Law created the National Pollution Control Commission to reduce environmental degradation. The Water Code addressed ownership, use, and conservation of water resources, promoting SD and equitable access. These decrees mirror the Stockholm Declaration's call for the right to a healthy environment (UNESCO, 1972), the Belgrade Charter's integration of EE across

education levels (UNESCO, 1977), and the Tbilisi Declaration, which introduced the definition of SD (UN, 1987). As a result, the Philippines Environmental Policy enacted through PD 1151 (1977) established a national framework for environmental protection, sustainability, and Environmental Impact Assessment (EIA) for projects (Manila, 1977). It further required government agencies to develop environmental standards and repeal any law conflicting with this decree. In accordance with the Philippines Environmental Policy (1151), PD 1586 (1978) established the Philippines Environmental Impact Statement System (PEISS) as the national framework for all EIA projects (Manila, 1978). By the 1990s, ESD was introduced and supported by key legislative measures like the Clean Air Act (RA 8749, 199) and the Toxic Substances Hazardous and Nuclear Waste Control Act (RA 6969, 1990), which helped implement EE themes across all educational levels (Chandran *et al.*, 2017).

In 2000, the Ecological Waste Management Act of 2000 (Republic Act 9003) mandated national audits and community-based strategies to address existing and emerging solid waste challenges (Trondillo *et al.*, 2018). This Act developed a programme with institutional mechanisms, incentives, penalties, and funding to address waste management (Republic of the Philippines, 2001). Section 55 of RA (9003) instructed the Department of Education (DepEd), Local Government Unit and national agencies to continuously conduct education programmes on public awareness, promoting community-based waste reduction and advocating eco-friendly products. Following the UN Decade for Sustainable Development (2005–2014), the government strengthened EE through the Education Act (RA 9512, 2008), incorporating environmental awareness into the school system (Chandran *et al.*, 2017). Ongoing efforts include *AmBisyon Natin 2040*, initiated through the National Economic Development Authority (NEDA) and formalised by Executive Order 5 (2016), and the Philippine Development Plan 2017–2022, both guiding sustainable national developments.

2.3.4 National Legislation on Environmental Education and Waste Programmes

2.3.4.1 Botswana: *Environmental Education Policy for Schools*

Since independence in 1966, Botswana's education system experienced transformative reforms aimed at expanding access, fostering SD and national cohesion (Generis Online, 2024, Molubi, n.d.). Historically influenced by traditional practices and Western models (Bagwasi, 2018), these reforms responded to shifting social and economic demands while meeting global commitment and new trends. Botswana formulated two major National Commissions on Education: The Kagisano Commission (1977) and the Kedikilwe Commission (1994) drafted landmark documents that shaped post-independence education (Republic of Botswana 1977; Republic of Botswana 1993). The 1977 reform was primarily driven by the urgent need to enhance the quality, availability, equality and equity of education, in response to socio-economic and geographic colonial-era disadvantages (Ketlhoilwe, 2007).

The government implemented EE into the curriculum within Botswana's local context and cultural content, including Art, Music, Literature, Language, History, Geography, Science, and Development Studies (Republic of Botswana, 1977a). This resulted in the second National Commission on Education (NCE, 1992), which submitted the Revised National Policy on Education (RNPE) in 1993 (Phuthego, 2007). In 1994, EE was also mandated in pre-service and in-service teacher training (Republic of Botswana, 1994). The National Development Plans (NDP) and the National Vision 2016 reinforced this, with NDP10 (2009–2015) emphasizing environmental awareness and the National Vision 2016 calls for an informed, environmentally educated nation (Kitso *et al.*, 2017; Ministry of Finance and Development Planning, 2009; Republic of Botswana, 1997b).

2.3.4.2 Zimbabwe: *Environmental Education Policy for Schools*

EE in Zimbabwe began in 1954 during the colonial period, when focus was conservation education targeting farmers, schools, and colleges (Chikunda, 2007). However, the development of environmentalism was noted in legislative landmarks like the Water Act

(1927), the Forest Act (1949), and the Water and Atmospheric Pollution Regulations (1971) (Murwendo *et al.*, 2010). These Acts resulted from the formation of the Natural Resources Board (NRB) established under the Ministry of Lands and Agriculture - which played a crucial role in research and the implementation of EE in formal, informal and non-formal institutions (Whitlow, 1988; Mapira, 2024). At primary level, EE was taught as Nature Study, and after 1980 was introduced as Environmental Studies or Science, and in Higher Institutions, it was offered under similar titles (Shava, 2003a; Auret, 1990; Mapira, 2012).

In 1987, Zimbabwe launched the National Conservation Strategy, following the UN's World Conservation Strategy (1978) "to integrate sustainable resource use into social and economic development and rehabilitate degraded resources " (Lopes, 1996:168). In 1992, Zimbabwe signed Agenda 21 document, pushing for clear environmental development policies (Murwendo *et al.*, 2010; Mapira, 2012). This led to the National Environmental Policy (2004), developed through an inclusive consultative process between 2000 and 2004 (Government of Zimbabwe, 2004; Van Ongevalle *et al.*, 2011). Stakeholders involved were the Commission of Education and Communication (CEC) members, the Zimbabwe Environmental Education Consultative Forum (ZWEECF), the Environmental Liaison Forum (ELF), the Department of Natural Resources (DNR) under the Ministry of Environment and Tourism (MoET), the Ministry of Higher Education and Technology (MHET) and the Ministry of Education Sports and Culture (MESC) (Shava, 2003b).

The first step saw ZWEECF drafting an Environmental Education Policy Discussion document (Shava *et al.*, 2000) and took steps towards national recognition of EE initiatives supported by the IUCN and the Network Capacity Building (NETCAB) policy project. This followed discussions with the MoET and the DNR concerning on-going efforts to develop a comprehensive policy framework (Shava, 2003b). A decade later, the Environmental Management Act (Chapter 20:27) of 2002 was implemented, and the principle in Section 4(2)(d) reads: Environmental education, environmental awareness and the sharing of knowledge and experience must be promoted in order to increase the

capacity of communities to address environmental issues and engender values, attitudes, skills and behaviour consistent with natural resource management for SD (MoET, 2002:12). This Act led to the establishment of the Environmental Management Agency- which is responsible for environmental management in the country (Government of Zimbabwe, 2009).

2.3.4.3 Nigeria: Environmental Education Policy for Schools

Nigeria's environmental conservation effort dates to the early 1960s, with participation in international environmental forums on resource, marine and coastal protection, as well as waste management (Norris, 2016). A major event happened between 1987 and 1988, when 18,000 drums of transboundary hazardous waste were illegally discarded in Koko, Nigeria's Niger Delta region (Ogbodo, 2009; Okafor, 2011; Waniko, 2015), prompting the government to enact stricter environmental legislation (Ogunba, 2016). Since the British Colonial Rule in the 1990s, Nigeria developed policies and comprehensive regulations to address environmental degradation through by-laws (Norris, 2016; Francis, 2024; Adelegan, 2006). The National Environmental Policy, initially introduced in 1989 (revised in 1999 and 2016) serves as a cornerstone in promoting SD with emphasis on pollution control, resource management, and EE to balance economic growth and ecological protection (NatureNews Africa, 2024; Akinwale and Udochukwu, 2025).

Consequently, the Federal Environmental Protection Agency of 1988 (FEPA), along with regulatory bodies such as the National Environmental Standards and Regulations Enforcement Agency (NESREA), were mandated to enforce environmental law so to safeguard, restore and conserve the ecosystem (Federal Republic of Nigeria, 1999). The Harmful Waste Act (1988) deals with the illegal disposal of toxic waste, while other Criminal Code (1958) focuses on water pollution and overseeing burials sites and the Public Health Act (1958) focuses on disease control, slaughtering of animals and waste disposal (Okafor, 2011, Omole and Akinbamijo, 2012; Oyefara, 2013). Following the Brundtland Report (1987), Nigeria enacted the Environmental Impact Act in 1992 (amended in 2004), required projects with potential environmental impacts to undergo EIA procedures (Nuwahereza, 2024). Recent policies such as the National Adaptation

Strategy and Plan of Action on Climate Change (NASPA-CCN, 2011) and the Climate Change Act (2021), established- the National Council on Climate Change (NCCC) and outlined mitigation and adaptation climate change strategies (UNEP, 2021). The Climate Change Policy Response and Strategy offer integrative guidelines for climate adaptation across sectors aim to regulate land use, reduce deforestation, promote renewable energy, and strengthen institutional frameworks for environmental protection (Olawuyi, 2020).

2.3.5 Local Legislation on Environmental Education and Waste Programmes

In South Africa, EE has been recognised and emphasised through successive policy documents, including the White Paper on Environmental Education (1989); the Reconstruction and Development Programme (RDP) (1994); the White Paper on Education and Training (1995); the Constitution of the Republic of South Africa (1996); the Environmental Management Bill (1998); the White Paper on Environmental Management Policy (1999); the RNCS (2002); and the Curriculum and Assessment Policy Statement (CAPS: 2011) (Buthelezi, 2015).

2.3.5.1 South Africa: Environmental Education Policy for Schools

The implementation of EE in South Africa has been significantly influenced by the Stockholm Declaration (1972), the Belgrade Workshop (1975) and the Tbilisi Conference (1977) during the apartheid regime. The year 1994 was a significant date in the history of South Africa – it was the moment when the country hosted its first constitutional elections, putting an end to the apartheid system (Graham, 2019; SAHO, 2019). This resulted in the development of the Reconstruction and Development Programme (RDP), which is a coherently combined socio-economic legal framework with the aim of mobilising South African citizens towards developing a democratic, multiracial, and non-sexist country (RDP, 1994). Moreover, the RDP endorsed EE through land appreciation, youth awareness, policy coordination, community action, and ethical advocacy. This document corresponds with The White Paper on Education and Training (1995), which introduced the first steps in the policy to incorporate EE in formal education (White Paper, 1995a).

This document cited the requirement of an interdisciplinary, integrated, and active approach to learning at all levels and programmes of education and training systems to produce environmentally literate and active citizens (White Paper, 1985b). In 1996, Section 24 of the Constitution of South Africa (Act 108 of 1996) was drafted, requiring all statutes to comply or be deemed invalid and recognised as the highest source of law in the land (RSA, 1996; Dube, 2020). The Constitution safeguards the right to a healthy environment and obliges the protection of natural resources for the advantage of current and future generations (RSA, 1996).

By the year 1997, the government published C2005 of 1998, which laid the foundation for the RNCS and the National Curriculum Statement of 2004, followed by the adoption of CAPS of 2012 (Pillay, 2014, Schudel, 2014). The aforementioned policy statements featured fundamental principles that include human rights, social justice, and inclusivity as defined in the Constitution (DoE, 2011:5). Additionally, CAPS includes Chapter One of the NEMA (1998), in which principle two requires safeguarding the physical, psychological, developmental, cultural, and social interests of people, and principle four (h) emphasises the importance of endorsing EE to empower community members to be accountable for their waste management practices (RSA, 1998). NEMA (Act 107 of 1998) was established to promote sustainable environmental management, serving as an umbrella law that sets principles for decision-making, establishes institutional cooperative governance, and coordinates environmental functions across government bodies.

From a municipal perspective, the government has statutory requirements to partake in activities relevant to EE and awareness. The eThekweni Municipality (formerly DSW) created the Cleansing and Solid Waste Unit to support a clean, safe environment, promote economic development through sustainable waste management and recognise solid waste as a useful resource where feasible (Abel, 2014). The Unit has adopted Integrated Waste Management, with an Education and Waste Minimisation division responsible for upholding the constitutional right to a healthy environment as outlined in NEMA, advancing the goals of the Polokwane Declaration and reducing illegal dumping and landfilling (Caws, 2010; Ndlovu, 2013).

The division is responsible for empowering and enabling community spheres to practise responsible waste management tradition through facilitation, liaison, education, and information sharing (Ndlovu, 2013), and among the target sector of the DSW Education and Waste Minimisation division are educational institutions. The educational institution programme provides a system that integrates education to respond to global environmental learning trends and to promote sustainable living among different communities and learners (eThekweni Municipality, n.d.). The programmes catered for schools include doorstep environment programmes, eduself booklets (a plain language resource guide that supports learners in EE knowledge, offering practical activities and reflection prompts to deepen understanding), school beautification, presentations and workshops, and radio slots (Ndlovu, 2013). This makes proper waste disposal the most important aspect of a waste management programme in an educational institution (Dolipas *et al.*, 2018). For this reason, this study aimed to investigate the implementation of waste awareness programmes into the curriculum in urban and rural public schools around Pinetown District secondary school.

2.3.6 The Definition and the Role of Civil Society Organisation

The Civil Society Organisations (CSO) have been instrumental in advancing EE and waste management initiatives in schools by supporting global environmental governance networks. They also play a crucial role in tackling urgent environmental issues by promoting democratic governance and advancing citizen well-being through advocacy for human rights, transparency, and responsive governance (Wang and Qiu, 2025; Hussein, 2024). CSO refer to non-profit entities that operate independently outside of the government structure, focusing on various domains, such as cultural, economic, political, and social issues (Chukwudi and Ojo, 2023; Asuelime, 2017). These entities are dedicated to assisting the government in addressing a wide range of societal challenges, including poverty alleviation, developmental concerns, healthcare provision, EE, and stewardship (Connolly, 2017). Additionally, these organisations advocate for policy reform, mobilise resources, and foster community participation to ensure accountability, inclusivity, and contribution to SDGs (Harper, 2025). The concept of CSO encompasses

various community-based groups, policy think tanks, independent media outlets, social organisations, religious groups, trade unions, professional bodies, and internationally affiliated groups with active branches across different countries (Chukwudi and Ojo, 2023; UNDP, 2011).

Building on the Johannesburg Summit (2002) and Chapter 36 of Local Agenda 21, ESD has gained global momentum through various school stewardship programmes such as Green Schools (USA, Mexico, China), Sustainable Schools (Australia, UK), Resource Smart Schools (Australia), and Eco-schools (Germany, India, Kenya, South Africa) (Kariuki *et al.*, 2023). Dauti (2014) noted the Eco-schools initiative as prominent across parts of Africa. The programme, governed by the Foundation for Environmental Education (FEE)—an international non-governmental and non-profit organisation—encourages a holistic school approach to EE (FEE, 2010; Hallfreðsdóttir, 2011). Therefore, the main aim of the Eco-School programme is to educate the youth about SD through classroom learning and community action (Hallfreðsdóttir, 2011).

2.3.7 International Perspective: School-based Environmental Education and Waste Awareness Programmes

2.3.7.1 United States: School-Based Environmental and Waste Awareness

In the United States, CSOs redefined policy change amid neoliberal reform and globalisation discourse, defining the role of states as coordinators rather than direct providers of welfare and governance (Jessen, 2021; Sargent, 2022). For instance, FEE, as one of the largest EE organisations, offers initiatives such as Eco-Schools, Learning about Forests (LEAF), and Young Reporters for the Environment (YRE) to enforce pro-environmental behaviour among youth and teachers (FEE, 2025). For example, a comprehensive literature review of 119 papers at Stanford University found that EE yields beneficial knowledge such as improved academic achievement, critical thinking, and life skills development like confidence, independence, and leadership (Ardoïn *et al.*, 2017). One study showed that a five-year EE initiative enabled 5th and 6th graders—with support from teachers and parents develop skills to identify local environmental challenges, make

informed decisions, and implement solutions in Hawaiian communities (Volk and Cheak, 2003). Similarly, an ethnographic study indicated that an environmental science course improved engagement at a Northeastern United States high school (Blatt, 2013). Together, these studies highlight how structured programmes and immersive coursework stimulate critical thinking, environmental literacy, and pro-environmental behaviour across different age groups and learning contexts.

2.3.7.2 Australia: School-Based Environmental and Waste Awareness

Australian schools have actively engaged in sustainability education through initiatives such as the Waste Wise Schools (Cutter-Mackenzie, 2010) and the Resource Smart Schools programme (Sustainability Victoria, 2022; Rickinson *et al.*, 2016). The Australian Waste Wise Schools programme supports primary and secondary schools through education-based plans to decrease landfilled waste and develop pro-environmental behaviour among learners and broader communities (Boulet *et al.*, 2016). Cutter-Mackenzie (2010) provided an analysis of the past, current, and future direction of the Waste Wise School programme. The study finding showed a notable sustainability custom in Australian schools as well as communities. The Resource Smart programme is another initiative that has been implemented and falls under the Victorian government's active plan, regulated by Sustainability Victoria (Sustainability Victoria, 2025). Adopting a holistic approach, this program helps schools embed sustainability in all their activities (Rickinson *et al.*, 2016).

2.3.7.3 Philippines: School-Based Environmental and Waste Awareness

In the Global South, major developing nations like China, Brazil, the Philippines, and India have followed suit, witnessing a rapid increase in the number of CSOs (Wang and Qiu, 2025). Acknowledging the strategic advantage of early intervention, the Philippine government ordered the DepEd to incorporate EE in the formal education system (Corpuz *et al.*, 2022). The DepEd, alongside Local Government Units, plays a crucial role in policy implementation. In accordance with this, the Local Government Unit of La Trinidad has developed a regional solid waste management programme at Benguet State University

In conjunction, Benguet State University initiated an Eco-Waste Management Program (BSU-EWMP) to reinforce the waste management initiatives (Dolipas *et al.*, 2018). The research study assessed students' waste management practices, and the findings indicate that participants place their garbage in bins without regard to its type; however, they often practise waste separation and utilise the provided waste facilities. The study concluded that further research is necessary to verify and validate the results of the current studies on a broader scale.

Another study conducted in Cagayan de Oro secondary school measured the extent of Solid Waste Management policies under the Republic Act 9003 and DepEd framework; findings show slight implementation (Garlape and Heyasa, 2017). Commonly, a study conducted at a state college in Zamboanga City evaluated senior high school students' awareness and waste management practices thereof (Molina and Catan, 2021). The findings revealed that students have sufficient knowledge on waste concepts, negative impacts, prohibited activities, and school initiatives; however, students possess limited knowledge on pertinent legislation pertaining to waste management (Molina and Catan, 2021).

2.3.8 National Perspective: School-based Environmental Education and Waste Awareness Programmes

2.3.8.1 Kenya: School-Based Environmental and Waste Awareness

Since 2002, the Kenya Organisation for Environmental Education (KOE) has implemented school-based EE and waste awareness programmes, growing from an initial pilot in twelve schools to over one thousand primary and secondary schools countrywide (Otieno *et al.*, 2020). The Eco-Schools Kenya Programme progressed with global strategies such as the Green Economy agenda, which promotes sustainable resource use, low-carbon growth, and inclusive development through circular economy enterprise in schools (KOE, n.d.). Topics under the Eco-schools' programme include water, sanitation and hygiene, energy, waste and litter management, biodiversity, sustainable

transport, healthy eating, sustainable agriculture, climate change, global citizenship, and enterprise development.

Influenced by the international Eco-Schools framework, the Mafanikio Community Based Organisation established a locally rooted Eco-Green School programme in Mbogolo, Kenya, integrating EE with community empowerment (Eco Green Schools, n.d.). This youth-led initiative in the marginalised coastal town of Mbogolo, Malindi sub-county, emphasises beach clean-ups and marine pollution (Mghenyi, 2025). However, like most development programmes, the implementation phase often faces challenges. Accordingly, the Kenyan Ministry of Education has noted ESD implementation barriers like limited comprehension of the concept, weakly developed policies, lack of skills and capacity development, poor stakeholder engagement, programme implementation resource scarcity, an overloaded exam-based curriculum, and the exclusion of pre-service and in-service teacher training (MoE, 2017). Moreover, a study by Simel (2012) in Nairobi emphasised ESD objectives as only achievable through a consultative stakeholder approach involving the government, educational institutions, the private sector, development partners and civil society. These stakeholders play a critical role in the successful implementation of ESD. The study compared students enrolled in the Eco-Schools programme with those not involved, examining knowledge, awareness, and behaviour. Findings revealed that Eco-Schools participants demonstrated higher knowledge levels than non-participants (Simel, 2012).

2.3.8.2 Zambia: School-Based Environmental and Waste Awareness

One of the earliest initiatives to integrate EE in schools was led by the Wildlife and Environmental Conservation Society of Zambia (WECZ), founded in 1953, which facilitated implementation of the Unite4Climate programme under the United Nations Children's Fund (UNICEF) (ZEMA, 2017). Over the past six years, the programme has resulted in the planting of more than 30,000 trees of various species in over 200 schools, implemented climate change adaptation through demonstration sites for conservation farming, trained 1,325 youths, and promoted sustainable recycling initiatives. The Zambian government had produced and presented the National Action Plan in 1994

(Nakwiza, 2019). The policy was adopted as the foundation for the provision of a National Policy on the Environment to serve as a guide for the Curriculum Development in Environmental Education (Curriculum Development Centre, 2013). This curriculum reform was followed by a two-week in-service training programme for teachers who would teach EE using an interdisciplinary approach, where 2000 primary school teachers were trained over a period of five years. It was offered by the Ministry of Education in partnership with the World-Wide Fund for Nature (Mwanza, 2016). Consequently, schools were required to form environmental clubs such as 'Think Green' and the Chongololo Club; these clubs encouraged greening activities, litter picking in school grounds, and celebrating 5th June on World Environment Day. Unfortunately, Milupi *et al.* (2022) revealed that effective teaching of EE still proves a big challenge for teachers in schools, while students' understanding of the concept of EE was still at a very low ebb.

2.3.9 Local Perspective: School-based Environmental Education and Waste Awareness Programmes

2.3.9.1 South Africa: School-Based Environmental and Waste Awareness

The South African civil society sector has experienced fragmentation over the past years, following the democratic transition, redefining its role across social, environmental and developmental spheres (NDA, 2016). In the Southern African Development Community (SADC) region, the EEASA played an influential role in the transitional trajectory from Natural Studies toward EE, the ESD, and related approaches such as the green economy (Damoah and Adu, 2022). The EEASA was instrumental in leading and shaping a new era of CSOs engagement in setting agendas and influencing practices. These include the Wilderness Leadership School, WESSA, World Wide Fund (WWF-SA), Birdlife South Africa, the Endangered Wildlife Trust (EWT) (Downsborough and Lotz-Sisitka, 2010), the DEAT, and SANParks. The Sustainable Schools Programme, led by Nature Connect in South Africa, connects schools, teachers, and other CSOs through a collaborative network that promotes environmental responsibility and supports best practices such as eco-gardens, recycling systems, and water-saving technologies (Nature Connect, 2023a). This initiative was designed to bridge the gap in EE and ESD within South African

schools. It also embraced a holistic approach that integrates environmental, social, and economic dimensions of sustainability into everyday teaching. Nature Connect has collaborated with organisations like One Planet SA to expand into provinces such as KwaZulu-Natal; for example, the Birches Pre-Primary School has been actively involved in a hands-on approach to EE. Learners participated in various activities, including expanding the school's recycling centre to include e-waste and repurposing purity jars into rosemary planters as part of their 'Trash Transformers' business project (Nature Connect, 2023b).

Their learning journey was enriched through interactive experiences, including animal encounters, garden-to-table lessons, and visits from environmental specialists. A comparable initiative to the Sustainable Schools programme is the Fundisa for Change Programme, which similarly fosters EE and ESD (SANBI, 2023). Coordinated by the SANBI Green Matter programme, this national programme instils environmental and sustainability education through teacher development, operating within an emergent consortium of the DEAT, higher education institutions, and other stakeholders (Fundisa for Change, 2023). The Eco-Schools programme, as the most prominent initiative in South Africa, has over a decade-long history of supporting the ESD, which aims to improve environmental literacy amongst learners (Dzerefos, 2020). Coordinated by the WESSA, in collaboration with the World Wildlife Fund of South Africa (WWF-SA), and endorsement from Nampak (Makokotlela, 2016), this programme was recognised at the UNCED (1992) and was started by the associations of the FEE with the backing of the European Commission (Buthelezi, 2015:2). Furthermore, this initiative complements the CAPS document, which noted EE and encourages stakeholder engagement and partnership between schools, local communities and organisations to achieve shared insights on environmentally responsible behaviour (FFE, 2017; Kruger, 2020). The Eco-Schools programme places great emphasis on providing strong teacher support as a main objective for archiving quality education (Khan, 2017). This is because the quality of the curriculum policy implementation process is mainly influenced by resource availability, teacher support and teachers' commitment, beliefs and experiences (Maluleke and Motlhabane, 2015). One example of schools featured as participating

members of the Eco-School programme includes Hilton Intermediate and Hawkstone Primary School, located in Karkloof in KwaZulu-Natal under the umbrella of the Midlands Meander Association Education Programme (Dell, 2010). The Midlands association programme collaborates with registered schools for the WESSA's Eco-Schools initiative, encouraging teachers to invent and use the school grounds as a learning resource for lessons in topics of biodiversity, water systems, indigenous agriculture, renewable energy and climate change (Dell, 2010).

2.3.10 Importance of Environmental Education and Waste Awareness Programmes in Schools

EE, especially waste management in schools, continues to incite interest, debates and research due to the large volume of waste generated in schools (Hamilton-Akeke and Tel, 2017). Unsound waste management is one of the environmental problems that are matters of concern in schools (Makisa, 2016). Schools can be pivotal in building awareness about the importance of sustainable waste development, not only among teachers and learners but also reaching out into the wider community (Van der Merwe *et al.*, 2009). Schools represent the next most important place of learning after homes, the reason being that students spend most of their hours at schools, which makes their contribution highly significant (Ana *et al.*, 2011). Therefore, the generation of waste needs extensive examination of several sources, including schools; moreover, waste generated from each source varies in terms of composition and quantity, reliant on prevalent activities and the human population in each location (Coker *et al.*, 2016).

In this way, schools and universities symbolise primary components of sustainability promotion in our societies (Iloja *et al.*, 2012). Because educating young adults about environmental management in schools is an effective way of reducing the amount of waste produced; this is supported by research which suggests that people have pro-environmental behaviour such as biospheric values (caring for nature and environmental protection) and environmental activism (Rada *et al.*, 2016; Balunde *et al.*, 2019). To illustrate, in Krakow, Poland, a study evaluated the impact of an educational training programme upon students', parents' and teachers' environmental knowledge, attitudes,

and behaviours (Grodzinska-Jurczak *et al.*, 2010). Students participated in the programme over a four-month period and were surveyed after completing the programme to evaluate any positive change. The findings showed that the programme improved the knowledge as well as the awareness of the students regarding municipal waste. Additionally, two more studies discovered that 60% and 64.4% of students, respectively, had positive attitudes towards solid waste management programmes (Desa *et al.*, 2011; Yildiz, 2011). However, it is still important for educational institutions to motivate students through education and awareness on solid waste; thus, the authors agree that to see tangible change in habits, behaviour and customs of students, a carefully planned waste education and awareness strategy needs to be developed. Furthermore, the suggestion of repetition on the determination of environmental sensitivity and development of policies dependent on their result, implementation and control of the legal laws, and the announcement of the results of the studies conducted or measurements to inform people were re-accommodated by Yildiz (2011). These studies cemented the important function of education and training in the context of environmental protection and raising public awareness of environmental duty.

2.3.11 Impediments to the Implementation of Environmental Education and Waste Awareness Programmes in Schools

The implementation of EE programmes in schools within developing countries is often confronted by several major barriers. Evans *et al.* (2012) noted challenges to ‘transcend place and time’, as observable from the existence of current research studies (Hebe, 2019). Key barriers include lack of resources, absence of certified and experienced administrators or trained teachers, logistics, and the non-existence of students’ commitments, interest, and sustainability awareness (Debrah *et al.*, 2021). In developing countries, schools often lack the resources (time and money) required to support meaningful sustainability interventions (McIntosh *et al.*, 2014). For instance, a study conducted in the Okavango Delta, Botswana, found that attempts to integrate EE into the subjects studied were limited by a shortage of academic resources and a lack of trained teachers (Velempini *et al.*, 2017). Similarly, Mokhele (2021) highlighted the importance of

ongoing evaluation studies, as South African schools also deal with untrained teachers, restricted time allocation, and excessive paperwork. Another South African study noted that the lack of funds, lack of time, and workload (huge classroom sizes) are among the challenges that impeded the effective implementation of EE in Ndwedwe schools, Durban (Mbatha, 2016).

Teachers and administrative support also hinder effective waste education in schools, as Verhulst and Lembrechts (2015) highlighted teachers' lack of interest and indecisiveness in igniting learners' passion for sustainability, while Maharajh *et al.* (2016) identified insufficient training among teachers and curriculum specialists as a major barrier. Mathenjwa (2014) further notes the absence of skilled and compliant EE experts. Therefore, sustainability cannot be adequately implemented in schools unless administrators and teachers are committed to promoting it (Herrera *et al.*, 2015). Herrera *et al.* (2015) emphasised that sustainability cannot be achieved without committed administrators and teachers. As attitudinal barriers also play a role, societal attitudes toward the environment influence schools whose issues are constantly worsened by subject/curriculum changes (Ifegbesan, 2010; Adeolu *et al.*, 2014).

Contrary to these views, Green and Somerville (2015) found that teachers are zealous supporters of sustainability education but often lack the confidence, skills and knowledge needed to integrate sustainability into the curriculum (Green and Somerville, 2015). Comparably, Mwendwa (2017) reported that Tanzanian teachers felt incompetent to teach EE due to insufficient knowledge. Research conveys the idea that EE is disadvantaged by numerous logistical constraints, particularly financial constraints. For example, Maharajh *et al.* (2016:397) mentioned that 'the implementation of EE is also plagued by financial constraints'. The government introduced the School Fee Exemption policy to accommodate the financially stretched parents from paying the mandatory school fees; the implementation of sustainability projects has been limited due to competing priorities and budget limitations (Setoaba, 2011; Wright, 2010). As these funds were supposed to purchase Learning and Teaching Support Material to implement effective practices (Badugela, 2012). Hence, schools are short of funds required for effective practices. For

this reason, this study wants to identify challenges of implementing waste awareness programmes.

In developing countries, logistical barriers hinder solid waste management, particularly in schools, due to inadequate waste facilities like data tracking systems and bin sorters (Debrah *et al.*, 2021). These sentiments were echoed by Hamilton-Akeke and Tel (2017), who described school waste practices as appalling, quoting shortages of tools, materials, and services resulting in large amounts of uncollected waste. It has been entrenched that local governments are responsible for enforcing the national waste management legislation; therefore, municipalities are legally bound to provide effective systems within their boundaries (Du Plessis, 2010; Kosoe *et al.*, 2019). However, most municipalities are confronted with challenges of how to effectively implement waste management initiatives, including South Africa, which has a plethora of waste management policies, acts and standards (Mbamuku-Nduku, 2012). Various studies highlighted the lack of waste facilities in schools; a study conducted in Akasenkese Senior High School found that the inadequacy of dustbins accounts for littering in schools' grounds (Sessi, 2014), while the study by Ana *et al.* (2011) found that in Ibadan, Nigeria, poor facilities hindered waste segregation, sorting, and recycling while other appropriate waste disposal methods became cumbersome. Igwe *et al.* (2017) revealed that environmental sanitation is foundational for school health, as it allows conducive and active learning. Therefore, the study aimed to identify if schools have waste management facilities.

From an economic perspective, promoting recycling in schools remains a problem, as focus often follows the traditional linear model of the 'take-make-consume-throw-away' pattern rather than encouraging a circular economy (Bourguignon, 2015). As waste management policy focusing on circular economy can benefit the schools, for example, Dwipsari (2014) opined that schools can create a model-based design for waste management as a tool for economic empowerment, bringing both educational and financial benefits. This study therefore aims to highlight the importance of waste management while promoting a clean and healthy environment.

2.4 CHAPTER SUMMARY

This chapter reviewed empirical and theoretical literature relevant to the study, focusing on learning models, policy implementation, curriculum development, the role played by CSOs, and implementation challenges, quoting narrative synthesis and relevant studies from international, national and local perspectives, and provided the foundation for the research objectives and questions.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter introduces a genealogical methodology, which specifically discusses the system of methods used when this study was conducted. A description of the study area, accompanied by a map, is included; the research design is defined, followed by a detailed explanation of the relevant research design for this study. This chapter further explains and clearly justifies sampling methods employed in this study, which include target population, sampling technique and method, sampling size and the calculation of the sampling size. Lastly, this chapter describes data collection and data analysis techniques used in this study; it also gives attention to matters of consideration.

3.2 STUDY AREA

This research study was carried out in six selected secondary schools, consisting of three urban-public and three rural-public secondary schools within the Pinetown District, KwaZulu-Natal Province, South Africa. Pinetown District is one of the twelve district municipalities in the Province of KwaZulu-Natal, South Africa (DoE, 2013), and the provincial education department has systematically decentralised its own management structures into administrative levels; as a result, Pinetown District has three Circuit Management Centres (CMC) and 17 Circuits. However, this study purposively invited one urban-public and one rural-public secondary school from each CMC, namely Hammarsdale-uMhlathuzana, Mafukuzela-Ghandi, and Durban Northwest.

3.2.1 Education

According to Department of Education (DoE) (2013) and Xineu (2021) statistics, there are 541 schools in the Pinetown District, of which 167 are secondary schools, made up of public schools, special schools, and private schools, while the KZN Education (2011) reported that the Pinetown District had the highest percentage of learners (12.19%) in the province.

3.2.2 Pinetown Location

The Pinetown area forms an integral part of the eThekweni Metropolitan Municipality, which is approximately at 29°49'S 30°51'E and covers an area of about 86.15 km² in the West Region of Durban at an altitude of 1,000 to 1,300 feet (305-395 m) (Frith, 2011). This city is located 16 km northwest of Durban and 64 km southeast of Pietermaritzburg, and for voting purposes, Pinetown falls under the Independent Electoral Commission (IEC) Ward 18. Pinetown is surrounded by several small towns; these include Westville to the east, Queensburgh to the southeast and Kloof to the northwest. It is also centrally bound by predominantly Black and Indian townships, including Clermont and Kwa-Dabeka to the northeast, Chatsworth to the southeast, Klaarwater to the south and Sgubudwini, Luganda, Mpola, Tshelimnyama and KwaNdengezi to the southeast (Britannica, 2008).

3.2.3 History of Pinetown

Pinetown was named after the leader of Natal, Sir Benjamin Pine (1873-1975). This metropolis was built in 1850 near Wayside Hotel, and it continued to develop in 1849 near the main waggon road, and it was officially recognised as a town in 1948 (Britannica, 2008). Pinetown was identified as the health resort because the British built a camp to shelter Boer women and their children during the Second Boer War (Waddington, 2011; Mathews, 1887). Pinetown stretches from Westmead, known as the industrial suburb in the west region, along Josiah Gumede route (old main road) or M1 to Cowies Hill in the east region; however, Pinetown's border strictly extends from Coversham Glen to Manor.

3.2.4 Population Demographics

Pinetown is characterised by a total population of 144,026 (1,671.71 per km²); the area consists of middle-income to upper-class groups with a racial make-up ranging from Black African (67.8%), Coloured (4.3%), Indian/Asian (9.3%), White (18.0%), and Other (0.6%) (Frith, 2011). The first languages include isiZulu, English, Afrikaans, isiXhosa and Others. Pinetown is also popular for its industrial activities, such as engineering, automotive and

logistics industries, and has a long history of manufacturing leather goods, concrete products, corrugated containers, plywood products, and confectionary.

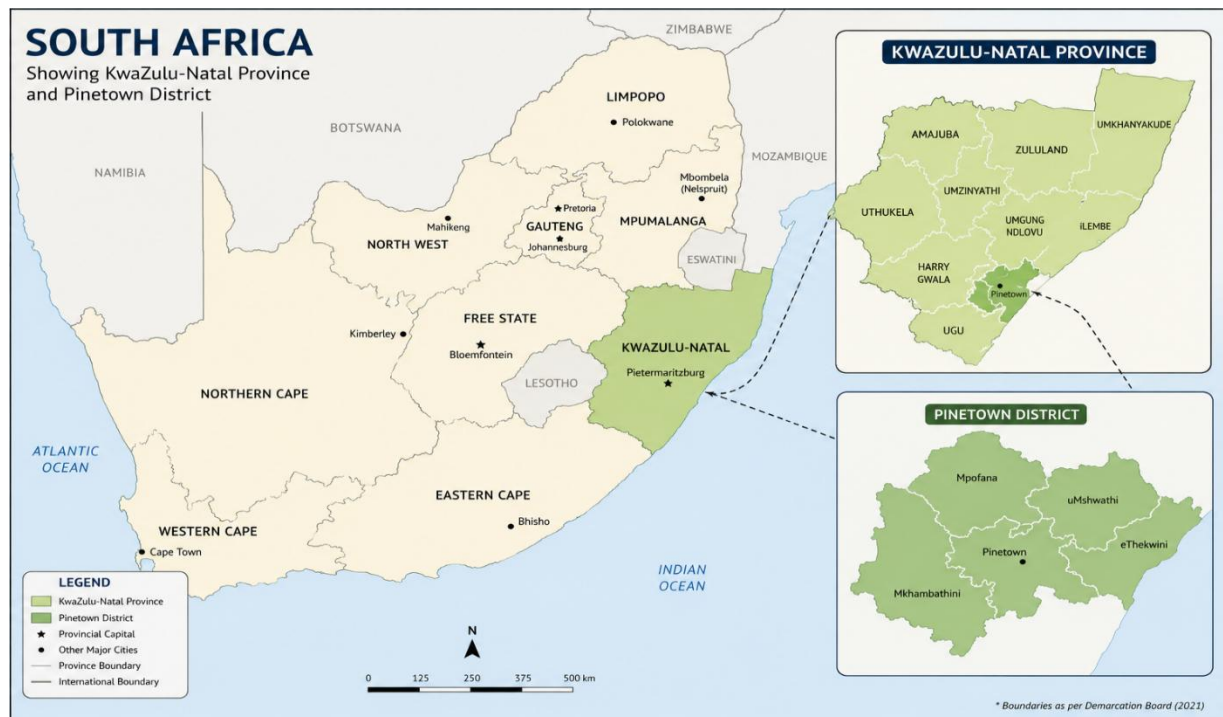


Figure 1: Map of South Africa showing Pinetown District within the Kwa Zulu-Natal province. **Source:** www.municipality.co.za (2018). (**Accessed:** 2026-05-16).

3.3 RESEARCH DESIGN

Research design can be labelled as the overall procedure chosen to combine different components of a study in a justified and coherent manner, while making unquestionably sure that the research problem is addressed. It is based on the conceptual design of gathering, quantifying, and analysing data (Akhtar, 2016). Therefore, to address research objectives, this study employed a descriptive quantitative and qualitative design, often cited as a mixed-methods approach. A mixed research technique integrates qualitative and quantitative methods in the same study (Molina-Azorin, 2016) and can embrace any of the six primary designs outlined by Creswell (2018), including convergent, explanatory, exploratory, embedded, transformative, and multiphase. This study adopted the convergent (also called concurrent and/or parallel) mixed-method approach, which

gathers quantitative and qualitative data separately, or parallel to each other (Katz-Buonincontro, 2024). Therefore, the collection of quantitative and qualitative data is independent from each other, and one type of data is not informing the collection of the other type of data (Bell *et al.*, 2022). The goal for mixed methods research is for both methods to supplement each other by capitalising on strengths and reducing weaknesses and increasing the validity and reliability of the research (Kabir, 2016).

3.4 SAMPLING METHOD

Sampling is defined as a strategy to select a certain number of individuals from a population group for research-specific purposes (Bhardwaj, 2019). Pandey and Pandey (2015) affirm that in sampling, small groups are chosen as representatives of the whole population for the reason of gathering accurate and reliable data about the population with a low level of cost, time, and energy.

3.4.1 Target Population

According to Barnsbee *et al.* (2018), 'target population' refers to the group of individuals intended to participate in the study and draw conclusions from. The target populations in this study were secondary school students and teachers in the Pinetown District, under KwaZulu-Natal. This study focused on three urban public and three rural public secondary schools under the Pinetown District, where two schools were selected from each CMC, namely Hammarsdale-u-Mhlathuzana, Mafukuzela-Ghandi, and Durban Northwest.

Please refer to Table 1 below to see how schools were purposely selected for this study. Please note that due to ethical reasons school names were numbered from A to F.

Table 1: List of the schools sampled in this study.

PINETOWN DISTRICT			
CIRCUIT MANAGEMENT CENTRE	SCHOOL(S)	CIRCUIT	LOCALITY
Hammarsdale-uMhlathuzana	School A	Mpumalanga	Urban
	School B	Mpumalanga	Rural
Mafukuzela-Ghandi	School C	Inanda	Urban
	School D	Inanda North	Rural
Durban Northwest	School E	Kranskloof	Urban
	School F	Ntuzuma	Rural

3.4.2 Sampling Technique and Method

In general, sampling methods can be categorised into probability and non-probability, where probability means that all members of the population have a probable chance of being selected in a sample (Taherdoost, 2016a), while non-probability sampling means there is zero probability that a member of the population is selected, therefore resulting in selection bias in the study (Acharya *et al.*, 2013). Probability sampling includes diverse methods of different sampling; these are simple random, systematic random, stratified random, cluster sampling, and multi-stage sampling, whereas non-probability includes stratified, cluster, and multi-stage quota sampling, snowball sampling, judgement/purposive, and convenient sampling (Taherdoost, 2016a). In the context of this study, a non-probability sampling technique, particularly stratified purposive sampling, was used as a means of selecting participants from the identified schools within Pinetown District.

This approach was selected due to constraints such as time, cost, resources and difficulty of access, and to ensure representation across key administrative strata: Hammarsdale-uMhlathuzana, Mafukuzela-Ghandi, and Durban Northwest. As Patton (2001) explains, purposeful samples can be stratified by selecting units that differ based on key dimensions, while Ahmed (2024) emphasises that one has to focus on subgroups within a population. Schools were intentionally selected based on the researcher's informed judgement regarding participants' knowledge and experience related to the phenomenon under investigation (Robinson, 2014). While this method enriches contextual relevance,

it is associated with researcher bias due to its subjective nature. This method can result in skewed or biased findings if the selection criteria are not clearly defined and consistently applied (Sharma, 2017). Moreover, there is no definitive way to guarantee that the selected participants truly represent the entire population, as the approach depends on the researcher's ability to assess suitability (Showkat and Parveen, 2017). Lastly, because this study aimed to evaluate the implementation of waste awareness in selected secondary schools under the Pinetown District, the research findings cannot be generalised for all South African schools across other districts.

3.4.3 Sampling Size

'Sampling size' refers to the act of selecting the number of individuals to include in a statistical sample (Bathinda, 2021). The research sample comprised six secondary schools, with two schools chosen from each CMC. In each identified secondary school, fifty (50) learners in Grade 9 and Grade 12 and one (1) educator were voluntarily sampled. The Grade 9 and Grade 12 learners were specifically chosen because they are the most senior students in the school based on the South African schooling structure. In South Africa, the education system is classified into the General Education and Training (GET) band, covering Grades R-9, and the Further Education and Training (FET) band, covering Grades 10-12 (Hellberg, 2014). The GET band is further divided into Foundation Phase Grade R-3, Intermediate Phase Grades 4-6, and Senior Phase Grades 7-9. Hence, Grade 9 and 12 learners were identified as the best individual groups to participate in this study. For practical reasons, teachers were selected as the most suitable participants because they are information-rich and experienced in the subject area, serving as the primary implementers of EE initiatives in schools as mandated by the DoE.

3.4.4 Sample Size Calculations

To calculate the population size for this study, the researcher first had to determine the number of people to include in this study. According to the Xisew (2021) statistics, 8410 learners wrote matric in the Pinetown District. However, because the researcher chose to sample Grade 9 and 12 learners per school, the researcher calculated the estimated

population as $8410 \times 2 = 16,820$, if the class of 2023 Grade 9 and 12 learners is the same amount as the class of 2021 Grade 12 numbers. Consequently, the population size was defined and determined as 16820.

The researcher further calculated the sample size by applying Yamane's (1967) simplified formula. This formula assumes a 95% confidence level and $p = 0.05$ and the calculated population size of 16820.

The calculation formula of Yamane is presented as follows:

$$n = \frac{N}{1 + N (e)^2}$$

Where: **n** = Sample size

N = Population size

e = Level of precision

Substituted numbers in the formula

$$n = \frac{16,820}{1 + 16,820 (0.05)^2}$$

$$n = \frac{16,820}{43.05}$$

$$n = 390.8$$

After calculating the sample size by substituting the numbers into the Yamane formula, the sample size was calculated as 390 participants. However, the researcher's intention was to sample Grades 9 and 12 per school, with a minimum of 50 respondents per grade; therefore, the sample size of 390 was rounded off to the nearest 100, which is ($n = 400$).

3.5 DATA COLLECTION TECHNIQUES AND PROCESSES

Data collection refers to a methodological process of gathering and measuring information on targeted variables to address research questions and evaluate outcomes (Ubaidullah, 2015). Depending on the research type, techniques include questioning, document review, observation, measuring or a combination of different methods (Abawi, 2017). According to Taherdoost (2021a), data collection techniques are classified into two categories: primary data collection—referring to original, first-hand information that has not been published or altered—and secondary data collection—referring to second-hand information from published or unpublished sources that has been statistically analysed and can be reused for other research purposes. Primary data sources are further subdivided into questionnaires, interviews, experiments, and surveys (Taherdoost, 2021b), while secondary data sources include records, research articles, and books (Taherdoost, 2021a). In this study, data was collected using three primary data sources, namely closed-ended self-administered questionnaires, semi-structured interviews, and observations, to balance the weakness that can arise from using one method.

Methodological triangulation (usage of multiple approaches) was chosen to help enhance the validity and credibility of the research findings of this study (Bhandari, 2022). Its fundamental objective is to eliminate bias that arises from using a single method (Noble and Heale, 2019). Methodological triangulation was also applied because using both qualitative and quantitative research methods is a form of triangulation viewed as mitigating the weaknesses found in a single method (Heale and Forbes, 2013). For example, the questionnaire collected quantitative data from learners, covering demographics, awareness, attitude, and practice questions. Semi-structured interviews collected qualitative data from teachers, which explored the extent of EE, school policies, resources, recycling initiatives, and challenges. Finally, an observation checklist was used to identify schools that have waste management facilities, enabling a systematic description of the subject under investigation.

3.5.1 Data Collection Tools

This section details data collection tools used in this study, highlighting advantages and disadvantages of using said tools and explaining how each data collection tool was developed.

3.5.1.1 Questionnaires

For this study, a questionnaire as a primary data source was used to gather information from learners (see Appendix 1). Roopa and Rani (2012:273) define a questionnaire as a list of printed questions that is completed by or for a respondent to express his opinion. According to Ahmad (2012), questionnaires are of two types – close-ended and open-ended questions – depending on the content of the survey. Closed-ended questions include dichotomous questions (e.g., yes/no); multiple-choice questions, where respondents select one preferred option from multiple questions; and checklist questions, where respondents can choose multiple applicable options.

In this study, dichotomous and checklist closed-ended questions were used to gather information from learners. The questionnaire was made up of three sections: Section A had demographics such as locality, age, gender, and race; Section B had awareness and knowledge questions with yes/no responses; and Section C had attitudes and practice questions, which consisted of checklist questions that allowed more than one response. The questions in this section were designed primarily to address the following objectives:

- **Objective 1:** To determine whether waste management and awareness are part of the school curriculum around Pinetown District.
- **Objective 2:** To determine if waste awareness campaigns/events/projects have been hosted before in schools.

Section C also included dichotomous questions and checklist questions, which were formulated primarily to address the following objectives:

- **Objective 3:** To evaluate the level of waste management awareness in schools.

- **Objective 4:** To evaluate the waste management facilities in schools around Pinetown District.

Questionnaires were hand-delivered by the researcher during the scheduled questionnaire session in a classroom environment. Respondents were required to answer the questionnaire within school premises; learners were also required to complete the questionnaire within a timeframe of 30 minutes upon distribution. The questionnaire was collected by the researcher on the same day; this was done to ensure confidentiality and avoid learners losing questionnaires. The process was also done to ensure that school activities were not disrupted. The practice was advantageous, as the researcher avoided returning to school repeatedly. Moreover, all activities relating to the parent consent form, learner consent and answering of the questionnaire were conducted during break time.

The questionnaire was only administered to learners with signed consent forms by parents and guardians. The researcher gave instructions on how to answer the questionnaire correctly. The questionnaire was written in English since learners are taught in English at schools; therefore, it is assumed that learners were competent in understanding and answering the questionnaire. However, where necessary, the researcher used vernacular (isiZulu) to facilitate the understanding of the questions, as schools visited have isiZulu as their first language, especially in urban-rural schools, where most learners struggle to understand the questionnaires. During the questionnaire session, the researcher was accompanied by a teacher appointed by the school principal. The presence of a teacher helped in maintaining order and created a comfortable environment for learners, as they are familiar with their teachers and trust them, therefore reducing any suspicion.

3.5.1.1.1 Advantages of a close-ended questionnaire

The researcher selected questionnaires with dichotomous and checklist questions due to their advantages; they reduce reliance on respondents' communication skills, allow quick responses for more questions, and increase completion rates. Closed-ended questions are easily coded and analysed, making data processing efficient while requiring minimal

interviewer skills, which facilitates self-administration. These benefits made the tool practical for learners and effective for gathering factual data aligned with the study's objectives (Hyman and Sierra, 2016).

3.5.1.1.2 Disadvantages of a close-ended questionnaire

It is also important to note that questionnaires have limitations that must be considered. Questionnaires cannot capture in-depth responses, often failing to generate new insights, and may be difficult to design since predetermined options may not reflect respondents' true attitudes. This procedure usually results in uncompleted responses that partially align with participants' views. Additionally, response categories may influence how respondents answer because the survey unintentionally hints at the correct' answer (Hyman and Sierra, 2016).

3.5.1.1.3 Reliability and Validity Issues

Generally, there are different measures that can be applied to eliminate some of the disadvantages of using questionnaires; these are validity and reliability. These measures, while linked, express distinct characteristics of the measuring tool (Middleton, 2022). Additionally, a measuring tool can be reliable without being valid; however, when a measuring tool is valid, it is most likely reliable (Surucu and Maslacki, 2020). These measures were fostered in this study and are discussed as follows:

i) Reliability

Reliability measures the degree to which a research tool yields similar results each time it is used, given that the underlying thing being measured is consistent (Crossman, 2019). To test the reliability of the instrument, the researcher applied a test-retest technique through a pilot study involving 15 secondary school learners in grades 9 and 12; these learners were not included in the final study sample. The 15 participants were chosen because Ying *et al.* (2025) recommends 10–30 participants as a reasonable number to highlight trends and improve methods before conducting a full study. The questionnaire was administered to the same secondary school learners at a two-week interval to ensure

that the research tool yielded similar results each time it was used. The feedback was used to refine the questionnaire by detecting any mistakes and correcting unclear and ambiguous questions before it was rolled out to the selected sample. The questionnaire was adopted from previous literature with the researcher's personal input.

ii) Validity

Validity can be phrased as the degree to which an instrument adequately measures what it is intended to measure (Drost, 2011). The researcher ensured the following different types of validity:

- **Face Validity**

Face validity refers to the extent to which, on face value, an instrument appears to measure a specific property (Taherdoost, 2016). This means face validity examines the formatting structure of the questionnaire pertaining to feasibility, readability, style consistency, and language precision. To ensure validity, the researcher gave the tool to a panel of experts, which in this case refers to supervisors. The aim was for supervisors to judge whether the items in the questionnaire appear to be relevant, unambiguous, and reasonable. The feedback was used to rework the questionnaire.

- **Content Validity**

Content validity refers to the extent a set of items is complementary to the relevant content domain of the construct that it is designed to measure (Kubai, 2019). To ensure content validity, the researcher showed the questionnaire to schools' principals and teachers at the selected secondary schools to consider their reaction regarding the format and language.

3.5.1.2 Interview

For this study, interviews as a primary data collection tool were used to gather information from teachers (see *Appendix 2*). Kabir (2016) describes interviews as verbally asking questions and receiving responses through individual or group face-to-face interactions.

Interviews are of different types; these include structured, unstructured, or semi-structured interviews. Structured interviews involve predetermined questions asked in a standardised order, while unstructured interviews gather in-depth and detailed opinions, as well as practices (Sahoo, 2022). Semi-structured interviews combine planned questions with flexibility, affording the interviewer the ability to adjust wording and order and add follow-up questions.

This research employed face-to-face semi-structured interviews with educators from designated secondary schools. This method was chosen because teachers hold relevant knowledge and experience as implementers of EE initiatives as mandated by the Department of Education. The interview comprised 17 questions across three sections: Section A – Introduction: this section includes questions about the subjects and grades taught, as well as the definition of EE. Section B – Awareness and Knowledge: The section delves into the incorporation of EE and waste management themes, the role of EE as a standalone subject, the responsibility for its teaching, and the presence of school EE policies. This section's questions were specifically designed to address the following objectives:

- **Objective 1:** To determine whether waste management and awareness are part of the school curriculum around Pinetown District.

Section C - Attitudes and Practice: the focus of this section was on the perspectives and practices of teachers in relation to EE programmes. The questions in this section were specifically designed to address the following objectives:

- **Objective 2:** To determine if waste awareness campaigns/events/projects have been hosted before in schools.
- **Objective 5:** To identify challenges of implementing waste awareness programmes in Pinetown District.

Each interview was conducted in quiet offices or classrooms within school premises, lasting 30–40 minutes. Scheduling was flexible to accommodate teachers' busy timetable

and avoid disrupting school activities. Abawi (2017) identified different ways of recording interviews, such as listening and scribing the respondent's answers, recording, filming their responses, or using a combination of all methods. Therefore, data was primarily collected through audio recording, with consent from participants using a digital voice recorder and supported by manual notetaking. Backup devices were available to prevent data loss, and notes were organised and supplemented with recordings to fill-in information gaps or details (Brinck *et al.*, 2010). Where participants declined recording, typed responses were used instead (Rosalind and Holland, 2013). Interviews were conducted in English, as teachers were competent in responding in the English language. This technique was appropriate because this study applied a mixed method, especially a qualitative approach combining manual and audio methods, which enhanced data quality while minimising weaknesses (Tessier, 2012).

3.5.1.2.1 Advantages of semi-structured interviews

Semi-structured interviews were used in this study because they offer flexibility, allowing dialogue between researcher and participant, follow-up questions, and comments while maintaining a thematic framework, enabling the researcher to observe non-verbal cues. This method facilitated the collection of in-depth information about teachers' opinions, feelings, perceptions, and practices (DeJonckheere and Vaughn, 2019).

3.5.1.2.2 Disadvantages of semi-structured interviews

There are also disadvantages associated with using semi-structured interviews which should be considered. Semi-structured interviews are time-consuming and labour-intensive (Adams, 2015), risk data loss if not conducted face-to-face (Kakilla, 2021), may encounter language barriers that reduce meaning even with translation (Kakilla, 2021), and can produce varied responses that limit generalisability and validity (George, 2022).

3.5.1.3 Observation

The researcher used a non-participant observational checklist as a primary data source to gather first-hand information that complemented interviews and questionnaires (see

Appendix 3). Qualitative observation, viewed as the most fundamental research approach in the social sciences, involves simply watching and describing subjects' behaviour until insights are gained (Smit and Onwuegbuize, 2018; Kumar, 2023). It enables the researcher to study real-life practices without prior categorisation. This approach involves various techniques that can be difficult to validate and compare, so the choice must align with the research problem and scientific context (Ciesielska *et al.*, 2018). The checklist had 11 questions divided into Section A – general waste management and Section B – recyclable material. The checklist also included a compliance and non-compliance point analysis indicator (0-5), and space for comments was used to capture detailed notes. Section A focused on issues such as availability and use of waste bins, types of waste generated, disposal methods, and litter-free environments, with dichotomous and multiple-response items guiding the researcher's recording of observed practices. These questions were based on answering the following objectives:

- **Objective 4:** To evaluate the waste management facilities in schools around Pinetown District.

Section B focused on recycling activities, including provision and labelling of bins (cans and paper), recycling projects (composting or gardening), designated recycling areas, and Personal Protective Equipment (PPE) for waste handlers, with dichotomous questions requiring 'yes' or 'no' responses. The questions in this section were formulated with the main purpose of answering the following objectives:

- **Objective 2:** To determine if waste awareness campaigns/events/projects have been hosted before in schools.
- **Objective 3:** To evaluate the level of waste management awareness in schools.

The researcher completed the checklist form during school hours with permission from school. Observations were conducted in a quiet setting, supported by notes and pictures to substantiate findings, ensuring that all ethical matters were considered.

3.5.1.3.1 Advantages of the observation method

Observation was chosen as a data collection tool because it is one of the most common methods, requiring minimal technical skills and being straightforward in comparison to other tools. The observation method captures the events and situation precisely as they happen without relying on respondents' accounts, therefore reducing bias. This approach also enhances accuracy, as the data collected is more reliable and independent of participants' ability or willingness to provide information (Ekka, 2021).

3.5.1.3.2 Disadvantages of the observation method

Observation has disadvantages that should be considered; these include susceptibility to observer bias influenced by knowledge, familiarity, consistency and bias. Observation is time-consuming and expensive and has limitations in capturing past events, which restricts understanding of previous situations (Ekka, 2021).

3.6 DATA ANALYSIS

Data analysis can be described as the method of meticulously employing numerical and/or logical techniques to characterise and demonstrate, summarise, and evaluate data with the aim of extracting valuable information that informs conclusions and supports decision-making (Mohammed and Taghipour, 2021; Brown, 2014). In simpler terms, data analysis is a system of placing facts and figures to interpret and solve the research problem (Ashirwadam, 2014). This study employed a qualitative and a quantitative approach, often overlapping between these two approaches. In analysing the study data, the objective was to interpret information gathered through questionnaires collected from learners, semi-structured interviews collected from teachers, and direct observation collected by the researcher. This involved reducing and synthesising the data to extract meaningful insights aligned with the research aim, objectives, and questions. This means data analysis was of two parts; the first phase involved quantitative analysis of close-ended learner questionnaires. The second part employed qualitative analysis to extract information from semi-structured interviews with teachers and observational data.

Table 2 indicates how schools were chosen and the sample size selected for this study. Please note that due to ethic reasons all variables for this study: school names, learners, teachers and observations which formed the basis of data analysis were assigned codes.

Table 2: Sample size and data analysis codes

PINETOWN DISTRICT									
Circuit Management Centre: Hammarsdale-uMhlathuzana									
Name of Circuit	Locality	No. of School(s)	Code(s)	No. of Learner(s)- Grade 9 & 12	Code(s)	No. of Teacher(s) Interviews	Code(s)	No. of Observation(s)	Codes
Mpumalanga	Urban	01	SA	82	SA	01	STA	01	SAO
Mpumalanga	Rural	01	SB	68	SB	01	STB	01	SBO
Circuit Management Centre: Mafukuzela-Ghandi									
Inanda	Urban	01	SC	45	SC	01	STC	01	SCO
Inanda North	Rural	01	SD	74	SD	00	STD	01	SDO
Circuit Management Centre: Durban Northwest									
Kranskloof	Urban	01	SE	78	SE	01	STE	01	SEO
Ntuzuma	Rural	01	SF	90	SF	01	STF	01	SFO
Total		06		437		05		06	

3.6.1 Analysis of Closed-Ended Learner(s) Questionnaires

Because this study used close-ended questionnaires to collect primary data, this rendered the data quantitative in nature. Responses were analysed using Statistical Package for Social Sciences (SPSS) version 29, beginning with data preparation – sorting questionnaires, measuring response rates, and converting raw responses into numerical codes. These values were then processed in SPSS and presented in graphical formats such as charts, percentages, and tables to address descriptive demographic variables and research questions. Quantitative analysis, defined as a structured process of gathering and evaluating verifiable data points (Ali, 2021), relies on close-ended questions that can be transformed into statistical values (Amaresan, 2021).

3.6.2 Analysis of Semi-Structured Interviews and Observation

Because this study used semi-structured interviews and observation to collect primary data, the resulting data was qualitative in nature. Consequently, the researcher followed the process of content analysis to interpret the findings. Content analysis refers to a systematic method used to analyse and interpret inferences of qualitative information (USGAO, 2012:4). The term describes interpreting the meaning in a message (Huma and Nayeem, 2017), such as semi-structured interviews and observational checklists used in this study. The transcripts were analysed using a continuous comparative approach with Atlas.ti, a computer-assisted qualitative data analysis system (Babbie, 2013). It is important to note, interviews and observations were analysed separately, as these are separate data sources.

The process of content analysis, according to Dye (2021), involves the following steps:

Step 1: Gathering and collecting qualitative data.

Step 2: Arranging and connecting qualitative data.

Step 3: Coding the qualitative data.

Step 4: Analysing the qualitative data for judgement and acumen.

Step 5: Reporting on the insights derived from the analysis.

3.6.2.1 Semi-structured Interview Data Analysis

The above-mentioned general terms of sequential steps for content analysis as recommended by Dye (2021) influenced the primary arrangement for the semi-structured interview and observational checklist data. Therefore, the study analysed semi-structured interviews through the following steps:

Step 1: Face-to-face semi-structured interviews and interactions were carried out with teachers as key informants from selected schools as a data collection method.

Step 2: The data collected through audio recordings were imported into the Atlas.ti project using the Add Documents function and transcribed with the built-in tool. No interviews were manually recorded, as all respondents consented to audio recording.

Step 3: The transcripts were reviewed for errors and missing segments, and comments were added to clarify contextual meaning where needed.

Step 4: The data was coded into main and minor themes, selecting relevant segments and quotations, with coding identified as assigning quotations to categories of meaning.

Step 5: Automated text analysis categorised interview transcripts into codes and sub-codes to identify similarities or differences. The researcher then read the quotations to check for emerging codes, discard irrelevant information, and write memos and comments for classification.

Step 6: Lastly, the memos, comments, and major themes identified and captured were used to attach meaning and significance to the analysis and used to write research findings.

3.6.2.2 Structured Walk-About Observation Data Analysis

The study analysed the observational checklist through the following steps:

Step 1: A personal field investigation and structured walkabout observations were conducted by the researcher.

Step 2: Observations data was manually translated into an Atlas.ti project while reading empirical data to understand what was observed and the meaning thereof.

Step 3: Codes were inductively identified from the data, and quotations were identified and assigned to a category of meaning.

Step 4: Automated text analysis categorised observational transcripts into codes and sub-codes to identify similarities or differences. The researcher then read the quotations to check for emerging codes, discard irrelevant information, and write memos and comments for classification.

Step 5: All themes and patterns identified during the analysis process were subsequently integrated into the final report.

The researcher considered matters of trustworthiness and reliability by checking the credibility of the data collected to ensure that the information is dependable (Bryman *et al.*, 2018). A two-phase qualitative analysis was followed: descriptive analysis involved reading through data for errors, gaps, and annotation using first-stage coding to identify categories and meaningful information. The second phase was conceptual analysis: coding and analytical tools were used to interpret the data collected in order to address questions identified for the study (Frieze, 2019).

3.7 ETHICAL CONSIDERATION

It is significant to note that the process of data collection always involves ethical issues that need to be considered and adhered to, especially in research that includes human participants. Bryman (2012) states that ethical issues occur throughout various phases during the course of the research and cannot be overlooked by reason of integrity. This means ethics are concerned with beliefs about what is right or wrong from a moral perspective (MacMillan and Schumacher, 2010). In other words, the researcher is

responsible for acting with morals and integrity and upholding the rights of all participants through informed consent, protection from harm, and the right to privacy. This requires the researcher to be truthful and honest with professional colleagues to whom the research findings are to be presented; hence, all ethical requirements were considered and adhered to as follows:

3.7.1 Permission to Conduct the Study

The researcher requested permission from the University of South Africa institution, and the ethical clearance certificate was submitted with the copy of the thesis for examination.

The researcher obtained permission to conduct the study from the University of South Africa by submitting an ethical research application form for research involving human participants. An approval ethical clearance certificate was granted by the University of South Africa to carry out the study (*see Appendix 4*).

Following approval from the University of South Africa, the researcher sought permission from the KwaZulu-Natal Department of Education, and permission was granted with conditions (*see Appendix 5*). The researcher used the approval letter from the KwaZulu-Natal Department of Education to obtain permission from the Pinetown District, which relayed the authorisation to circuit managers overseeing the study.

With approval from the DoE and Pinetown District, the researcher sought permission from principals and School Governing Bodies (SGB) of selected schools. Permission letters from UNISA and the DoE were presented to secure formal access, after which schools were contacted by phone or email to arrange visits. The researcher introduced the study, outlined the purpose of the study and participants, highlighted benefits, clarified matters related to cost compensation and consent forms, and addressed questions or concerns that were raised by the schools.

The aim of these letters was to introduce the researcher and seek permission to conduct the study and assistance, which in turn reduced any suspicions.

3.7.2 Informed Consent Matters

Informed consent is described as the founding principle of research ethics (Miller, 2016), a process where participants decide to enter research voluntarily based on clear, sufficient information about the study and the implications (Klykken, 2021). Informed consent ensures research standards of respect and justice.

3.7.2.1 The Process of Obtaining Informed Consent

In this study, ethical guidelines and regulatory procedures were strictly observed throughout the data collection process. Following the formal approval from all relevant stakeholders, these are as follows:

3.7.2.1.1 Learners' Informed Consent Process

Step 1: After permission was obtained from the University of South Africa, the Head of the Department of Education KwaZulu-Natal, the Pinetown District office, the school principal and the SGB. The following step was obtaining informed consent from parents and then from learners themselves.

Step 2: Principals from each selected school appointed a teacher to introduce the researcher to Grade 9 and 12 learners. Teachers explained the purpose, benefit, compensation, and consent requirements of the study. This precaution was essential, as the researcher could not approach learners without parental or guardian consent. The assigned teachers distributed informed consent forms for signature (*see Appendix 6*), because most learners were under 18; therefore, parental and/or guardian consent along with learner assent was required.

Step 3: After obtaining consent from parents and/or guardians and learners, the appointed teacher accompanied the researcher into classrooms to introduce the study. This ensured order and created a comfortable environment, as learners were familiar with and trusted their teacher.

It should be noted that learners without signed parents' and/or guardians' consent were excluded from participation in this study. The researcher clearly explained, using age-appropriate language, that participation was voluntary, with no obligation to consent, and learners were assured that non-participation would not result in any penalty or loss of benefits. To minimise disruption of school activities, all research-related procedures, such as consent procedures and questionnaires, took place during lunch or free periods. Clear instructions were provided, and all questionnaires were completed the same day on school premises to prevent loss and uphold confidentiality.

3.7.2.1.2 Teachers' Informed Consent Process

Step 1: After permission was obtained from the University of South Africa, the Head of the Department of Education KwaZulu-Natal, the Pinetown District office, the school principal and the SGB. The following step was obtaining informed consent from teachers.

Step 2: The appointed teacher was selected as a suitable interview participant, based on the established professional relationship with the researcher. To support this process, a participant information sheet proving the details of the research project, along with a consent form requiring signature, was provided (*see Appendix 6*), and participation was left to the discretion of each individual.

3.8 CHAPTER SUMMARY

This chapter presented the methodological framework applied in the study. It provided a detailed description of the study map area and outlined the research design and sampling methods and processes adopted. The chapter further detailed the data collection and data analysis techniques used in this study and addressed key ethical considerations.

CHAPTER FOUR: PRESENTATION OF THE RESULTS, INTERPRETATION AND DISCUSSION

4.1 INTRODUCTION

This chapter displays the findings of this research study in accordance with the explanation of the methodology detailed in Chapter Three. The discourse and translation of data in this chapter is based on the data collected through learner questionnaires, semi-structured teacher interviews and observations conducted by the researcher. The collection and interpretation of data in this study was intended to facilitate understanding of the implementation of waste awareness programs in Pinetown District Schools, eThekweni Municipality, South Africa.

4.2 QUANTITATIVE FINDINGS, INTERPRETATION AND DISCUSSION

This section presents the results of the respondents that participated in this study, collected through questionnaires from Grade 9 and Grade 12 learners. Learners were questioned about their level of awareness, knowledge, attitude and practices for the purpose of evaluating the implementation of waste awareness programmes in secondary schools under Pinetown District, eThekweni Municipality, South Africa. The quantitative findings in Table 3 below show varying degrees of learners' participation across the selected secondary schools within each CMC. Under the Hammarsdale–uMhlathuzana Circuit, two schools located in the Mpumalanga area recorded a total of forty-five ($n = 45$) participants in Grade 9 and thirty-seven ($n = 37$) participants in Grade 12 in one school, while the second school recorded a total of forty ($n = 40$) participants in Grade 9 and twenty-eight ($n = 28$) participants in Grade 12. Under the Mafukuzela–Gandhi Circuit, the selected school in the Inanda North area yielded a total of twenty-four ($n = 24$) participants in Grade 9 and fifty ($n = 50$) participants in Grade 12, whereas the school in the Inanda area yielded twenty-six ($n = 26$) participants in Grade 9 and nineteen ($n = 19$) participants in Grade 12. Lastly, under the Durban Northwest Circuit, the selected school in the Kranskloof area had a total of thirty-one ($n = 31$) participants in Grade 9 and forty-seven ($n = 47$) participants in Grade 12, while the school in the Ntuzuma area recorded forty (n

= 40) participants in Grade 9 and fifty (n = 50) participants in Grade 12. Most schools reveal higher participation rates among Grade 12 learners, potentially due to their increased academic growth, curriculum exposure, or inclination to participate in research activities. The figures also underscore the importance of school-level support and learner availability in shaping participation outcomes.

Table 3: List of schools, codes and sample size involved in this study

PINETOWN DISTRICT					
Circuit Management Centre: Hammarsdale-uMhlathuzana					
Name of Circuit	Locality	Numbers of School(s)	Code(s)	Number of Learner(s)-Grade 9	Number of Learner(s)-Grade 12
Mpumalanga	Urban	01	SA	45	37
Mpumalanga	Rural	01	SB	40	28
Sub-Total		02		85	65
Circuit Management Centre: Mafukuzela-Ghandi					
Inanda North	Urban	01	SC	24	50
Inanda	Rural	01	SD	26	19
Sub-Total		02		50	69
Circuit Management Centre: Durban Northwest					
Kranskloof	Urban	01	SE	31	47
Ntuzuma	Rural	01	SF	40	50
Sub-Total		02		71	97
Total		06		206	231

4.2.1 Demographic Profile of Respondents

This section presents data from Section A, which includes demographic information such as gender and age of the respondents.

4.2.1.1 Gender Ratio of Respondents

Section A of the questionnaire required general demographic information of the respondents; therefore, the information in Figure 3 depicts the gender of Grade 9 and

Grade 12 learners that participated in this study. The sample had a total of 78.3% (n = 437) respondents; 57.4% (n = 251) were females and 42.6% (n = 186) were males. This total was the overall number of all learners in Grade 9 and Grade 12 from the six secondary schools surveyed in Hammarsdale-uMhlathuzana CMC, Mafukuzela-Ghandi CMC, and Durban Northwest CMC under Pinetown District. For Grade 9, 61.2% (n = 126) of respondents were females and 38.8% (n = 80) were males, whereas in Grade 12, 54.5% (n = 126) were females and 45.5% (n = 105) were males. The results show more female participants compared to their male counterparts.

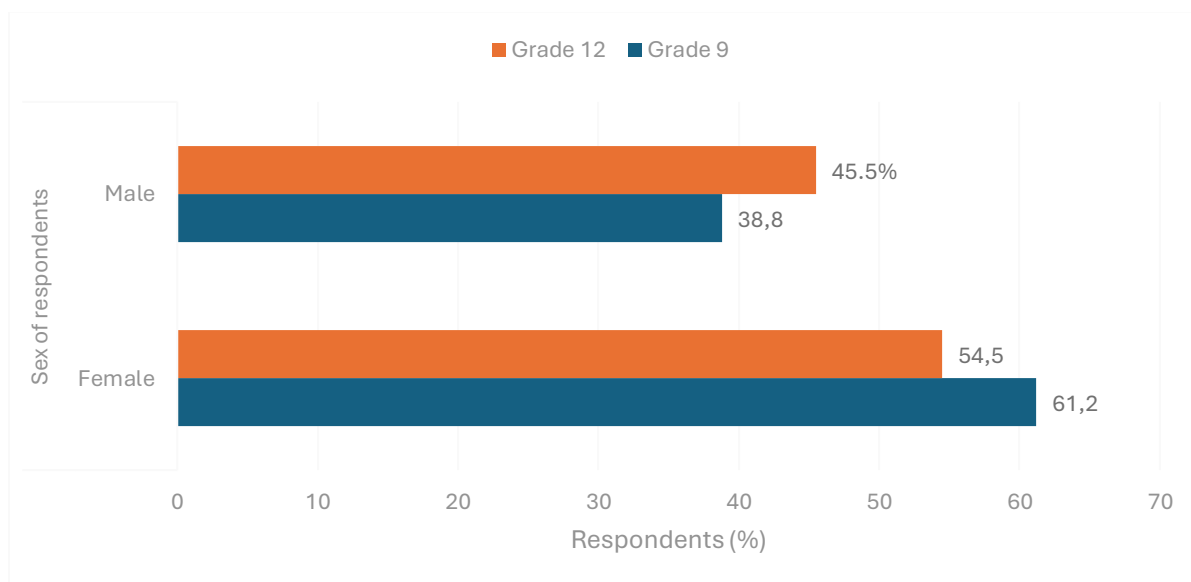


Figure 2: Gender of respondents per grade (n = 437).

4.2.1.2 Age Structure

The age structure in Figure 4 indicates that 90.3% (n = 186) of the learners in Grade 9 were between the ages of 13 and 15 years old, and 9.7% (n = 20) were between 16 and 18 years old. For Grade 12, 90% (n = 208) of the learners were between the ages of 16 and 18, while 10% (n = 23) were 19 years or older. Although the 16–18 age category appears in both grades, these percentages are grade-specific and represent the total population within each grade cohort. In Grade 9, the 16–18 group reflects a small proportion of learners who were older than the average age for that grade, whereas in Grade 12 the same age group represents the majority of learners and were included in

this study due to their relevance to this study and low percentage rate. This overlap can be attributed to contextual factors in impoverished areas, where learners often begin school at an older age than the average age for a specific age (Van Nierkerk, 2014). The inclusion of both Grade 9 and Grade 12 learners was intentional, as they are the most senior students in their schools according to the South African schooling structure, and thus well positioned to provide insights into the implementation of waste awareness programmes in Pinetown District schools. The Grade 9 and Grade 12 learners were specifically chosen because they are the most senior students in their schools based on the South African schooling structure; therefore, they are well positioned to provide knowledge relating to the implementation of waste awareness programmes under Pinetown District schools.

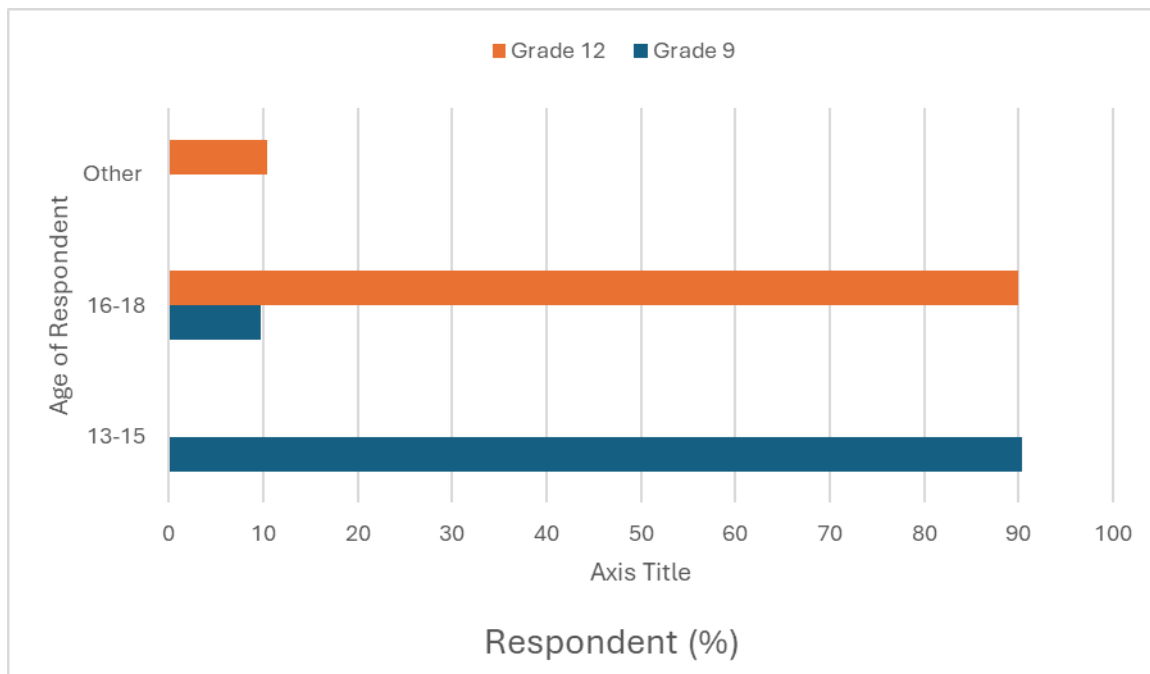


Figure 3: Age structure of respondents per grade (n = 437).

4.2.2 Learners Level of Awareness and Knowledge

The data presented in this section provides results from questions (5–18) of Section B – awareness and knowledge information gathered from respondents. Section B consisted of dichotomous questions which required learners to select a ‘yes’ or ‘no’ response and

checklist questions which required learners to select multiple-choice responses from a single question.

4.2.2.1 Learners Level of Awareness and Knowledge of Environmental Concept and Impacts

Respondents were asked to indicate their understanding of various environmental phrases; these include 'waste', 'waste management' and 'environmental education'. The research findings in Figure 5 below revealed that the majority, 86.3% (n = 176) of learners in Grade 9 and 92.6% (n = 214) of learners in Grade 12, knew exactly what waste is (Amasuomo and Baird, 2016), and 13.7% (n = 28) of learners in Grade 9 and 7.4% (n = 17) of learners in Grade 12 have no idea of what the term means. Overall, 78% (n = 435) of participants responded to this question. Waste management remains a major ecological challenge facing modern civilisations (Kalambura *et al.*, 2015), and the focus should be on its effective management (Ikhuoso, 2018). For this to be accomplished, learners require having a clear understanding of what the concept 'waste management' means. As shown in Figure 4, only 36.9% (n = 75) of respondents in Grade 9 and 68.6% (n = 157) of respondents in Grade 12 understand the concept of waste management, whereas 63.1% (n = 128) in Grade 9 and 31.4% (n = 72) in Grade 12 had opposing views. In total, 77.4% (n = 432) of participants responded to this question.

In understanding the term environmental education, findings show that 60.1% (n = 122) of Grade 9 learners and 70.6% (n = 161) of Grade 12 learners understood the meaning of *environmental education*, while 39.9% (n = 81) of Grade 9 and 29.4% (n = 67) of Grade 12 learners reported not understanding the term. In total, 437 learners who participated in the study, 77.2% (n = 431) provided valid responses that were included in the analysis. Overall, the results demonstrate that majority of learners are aware of and able to clarify various environmental concepts (Boiyo, 2014), particularly waste and environmental education. However, the findings in Figure 4 highlight that most Grade 9 learners lack knowledge and understanding of waste management. Based on these results, it can be concluded that environmental education and waste awareness topics are, to some degree, integrated into the school curriculum; nonetheless, greater effort and

enforcement are required to strengthen this integration through improved information, education, and training (UNEP, 1992).

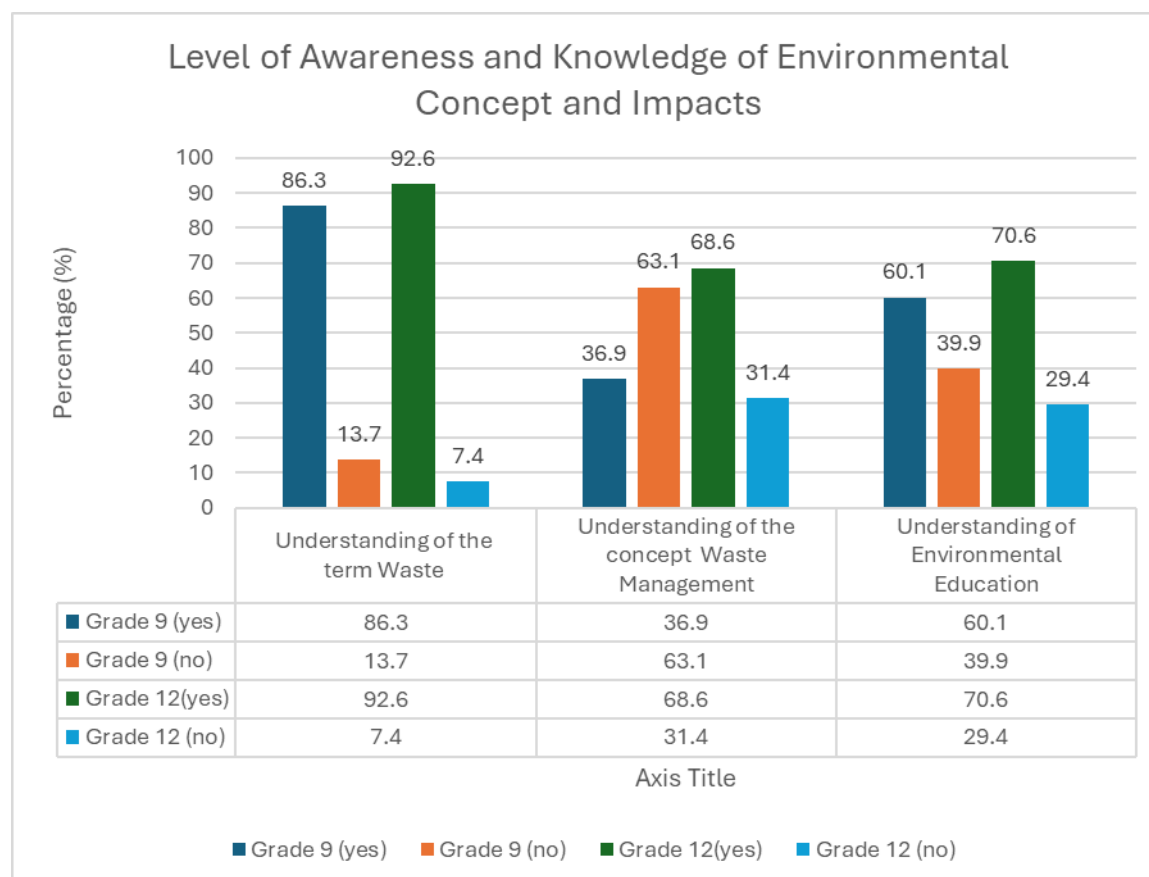


Figure 4: Level of awareness and knowledge of environmental concept and impacts.

4.2.2.2 Level of Awareness, Attitude and Beliefs towards Waste Management Issues

Poor knowledge and practices of waste management in schools can negatively affect students' academic performances, causing disease outbreaks such as cholera and diarrhoea (Ampofo, 2020). Hence, respondents were asked to indicate if they are aware of any negative impact of improper waste management on the environment. The results in Figure 5 below indicate that a larger percentage of 59.6% (n = 121) respondents in Grade 9 and 70% (n = 159) of respondents in Grade 12 understand the implications associated with poor management, whereas 40.4% (n = 82) of respondents in Grade 9

and 30% (n = 68) of respondents are not aware of the negative impact related to poor waste management in the environment. In total, 77.1% of respondents (n = 430) were calculated in this question. These findings concur with studies that reported students were familiar with the effects linked to waste disposal, encouraged the adaptation of pro-environmental behaviour, and prevented negative impacts (Molina and Catan, 2021; Mohiuddin *et al.*, 2018).

Education was further identified a crucial aspect in the mandate of waste management and plays a pivotal role in shaping waste habits of learners, as majority of 89.7% (n=182) respondents in Grade 9 and 91.3% (n=210) respondents in Grade 12 agreed with this statement. However, a minority of 10.3% (n=21) respondents in Grade 9 and 8.7% (n=20) respondents in 12 disagreed. In total, 77.6% (n=433) responses were recorded for this question. These findings are comparable to a study that implemented a four-step curriculum development process, the study found that students had higher environmental literacy, awareness, and participation after learning through the solid waste management syllabus (Singseewo and Tritip, 2016).

To evaluate learners' waste practices and attitudes, respondents were asked to indicate their beliefs regarding lifestyle change as a means of eliminating waste issues. Results revealed a high rate of a high rate of 85.8% (n = 175) of respondents in Grade 9 and 79% (n = 181) of respondents in Grade 12 who displayed positive attitudes, and 14.2% (n = 29) of respondents in Grade 9 and 21% (n = 4) of respondents in Grade 12 do not believe lifestyle change can contribute to waste prevention. In total, 77.6% (n = 433) of respondents answered this question. The assertion of the above findings confirms that learners have positive attitudes towards the environment and proves that learners are concerned about environmental issues, specifically waste management problems. This is important in understanding the ebb and flow of individuals and collective beliefs associated with various environmental issues (Afangideh *et al.*, 2012), especially because waste production rates are rapidly increasing due to population growth, lifestyle changes, unsustainable consumption rates, economic development, and the throw-away culture (Smith, 2020; Strydom, 2018).

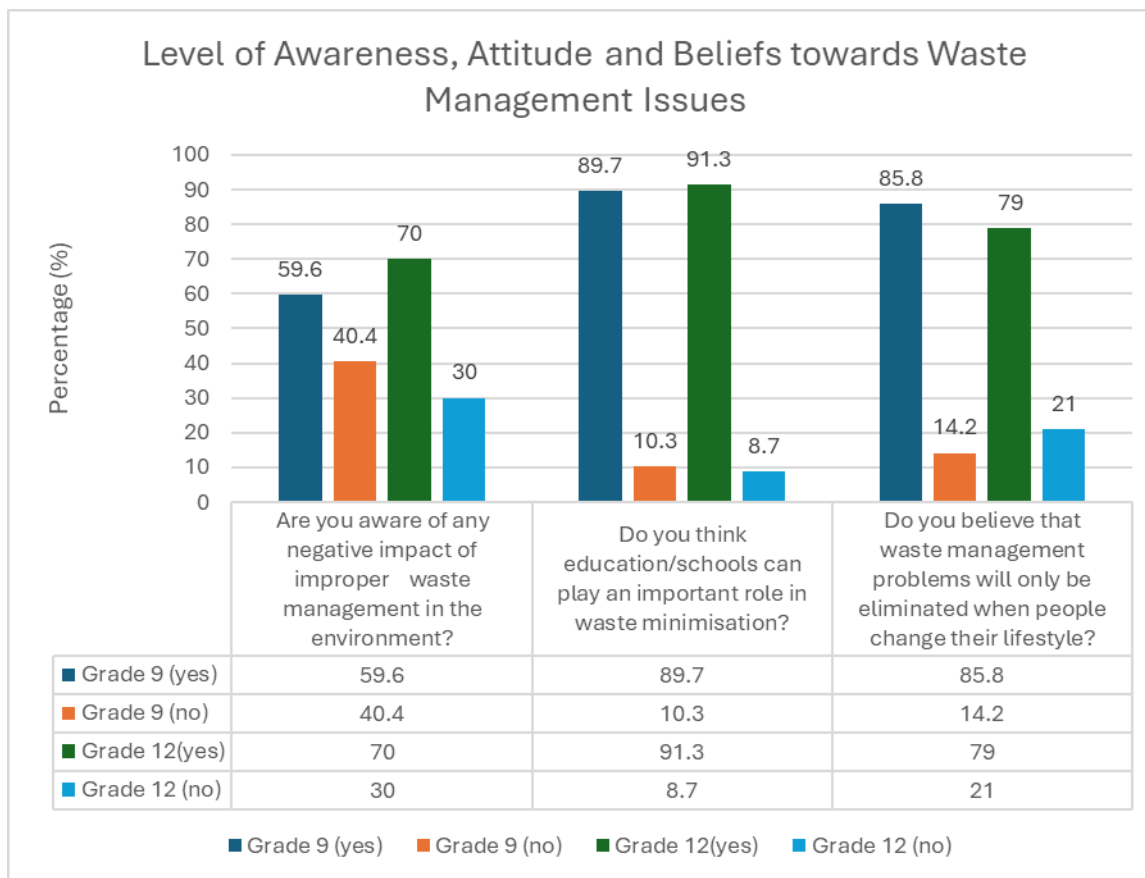


Figure 5: Level of awareness, attitude and beliefs towards waste management issues.

4.2.2.3. School Subjects with Environmental Education and Waste Awareness Content

The results in Table 4 present school subjects that implemented EE and waste awareness content. A significant number of 76.9% (n = 130) of respondents in Grade 9 and 77.4% (n = 175) of respondents in Grade 12 confirmed that there are specific subjects that cover EE and waste awareness themes; in contrast, 23.1% (n = 39) of respondents in Grade 9 and 22.6% (n = 51) of respondents in Grade 12 gave opposing views. The overall sample was 70.8% (n = 395) for this question.

Table 4: Integration of environmental education and awareness subjects in the curriculum

Grade(s)	Response(s)	Frequency	Percentage
Grade 9	Yes	130	76.9%
	No	39	23.1%
Sub-total		169	100%
Grade 12	Yes	175	77.4%
	No	51	22.6%
Sub-total		266	100%
	Missing	42	29.2%
	Total	437	100%

As a follow-up question, respondents were required to name the subjects that promote and teach EE and waste awareness. Overall, 53.0% (n = 296) of responses were recorded for this question. The results in Table 5 show that Life Orientation was chosen as a dominant subject that informed learners about EE and waste awareness. This subject was cited by 62.2% (n = 77) learners in Grade 9 and 65.9% (n = 114) learners in Grade 12. These findings prove that the South African education system has integrated EE in the Life Orientation curriculum and teachers have made an effort to teach it. This is based on the initiative of the DoE to include the topic of social and environmental concerns in the Life Orientation subject (DoE, 2011a). Topic overview in Grade 9 includes the concept of volunteerism and health and safety issues related to violence (DoE, 2011b), while the Grade 12 curriculum includes environments and services which promote safe and healthy living, responsibilities of various levels of government and a personal mission statement for life (DoE, 2011a).

However, a qualitative study conducted by Jacobs (2011) in the North-West province provided evidence that Life Orientation failed to achieve its objective as outlined in the CAPS. This is because despite key elements that exist between EE and life orientation, the greatest challenge that remains is whether teachers can integrate a holistic approach of knowledge, skills and values in their teaching and learning practices to promote and improve social and environmental responsibility among learners (Swarts *et al.*, 2015). Additionally, integrating EE proves difficult because CAPS introduces a content reference approach to social and environmental problems as the basis for learning; time allocation to cover content material on social and environmental concerns, adherence to the

departmental summative assessment (examination paradigm) and the role of the teacher in formulating learning assignments are not distinctively explained.

The subject of Geography is considered a contributing factor through which EE can be implemented and taught (Ferreira and Molala, 2017). This claim was supported by the International Geographical Union Commission on Geographical Education (IGU-CGE, 1992; IGU-CGE, 2016), which views Geography as a key player, a powerful resource, and a vital subject for promoting EE. This subject, as a combination of physical and human processes topics over space and time (DoE, 2011c), was reported to integrate environmental issues by 4.1% (n = 5) of respondents in Grade 9 and 46.2% (n = 80) of respondents in Grade 12. It is clear from the above-mentioned results that Geography, to a certain extent, has EE content; however, the level of implementation remains relatively low. The results are disappointing considering the fact that Geography is viewed as a key player, a powerful resource and a dominant subject through which EE can be implemented and taught (IGU-CGE, 1992; IGU-CGE, 2016; Ferreira and Molala, 2017).

Natural Science constitutes life sciences as well as Chemical and Physical Sciences (Mashaba *et al.*, 2022). This subject was noted by 39.8% (n = 49) of respondents in Grade 9 and only 0.6% (n = 1) of Grade 12 learners, whereas Life Science accounted for 3.3% (n = 4) of respondents in Grade 9 and 15.6% (n = 27) of respondents in Grade 12. The research findings in this study revealed discrepancies between Natural Sciences and Life Sciences because Natural Science is only taught in Grade 9 but subdivided into Life Science and Physical Science in Grade 12 (DoE, 2011d). By contrast, Tourism, Arts & Culture (known as Creative Arts) and Other were the least recognised subjects. Tourism accumulated 0.8% (n = 1) in Grade 9 and 16.2% (n = 28) in Grade 12, while Other identified 4.9% (n = 6) in Grade 9 and 3.5% (n = 6) in Grade 12, and Arts & Culture only tallied 7.3% (n = 9) of respondents in Grade 9. The research findings in this study highlight the important role played by school subjects like Life Orientation, Geography and Natural Science and/or Life Sciences. This claim is supported by similar research findings of an evaluation study conducted by Ndzimbomvu *et al.* (2021) on subjects that delivered environmental knowledge to learners, thus inciting positive attitudes and practices

towards the environment. These subjects had relatively commendable content on environmental topics compared to other school subjects.

Table 5: School subjects with environmental education and waste awareness content.

			Grade (s)		
	Subjects	Count(s) & Percentage(s)	Grade 9	Grade 12	Total
Subject with EE & Waste Awareness content	Life Orientation	Count	77	114	191
		% within Grade	62.6%	65.9%	
	Geography	Count	5	80	85
		% within Grade	4.1%	46.2%	
	Natural Science	Count	49	1	50
		% within Grade	39.8%	0.6%	
	Life Science	Count	4	27	31
		% within Grade	3.3%	15.6%	
	Tourism	Count	1	28	29
		% within Grade	0.8%	16.2%	
	Other	Count	6	6	12
		% within Grade	4.9%	3.5%	
Arts & Culture	Count	9	0	9	
	% within Grade	7.3%	0.0 %		
Total Count			123	173	296

4.2.2.4 School-Based Approaches to Waste Reduction Strategies

Respondents were required to identify effective ways of minimising waste on school grounds, and the overall response was 74.6% (n = 416) for this question. Table 6 below illustrates that half of the respondents, 51.8% (n = 102) in Grade 9 and 52.1% (n = 114) in Grade 12, identified designated recycling bins as an effective way to deal with waste, while 44.7% (n = 88) of respondents in Grade 9 and 37.0% (n = 81) of respondents in Grade 12 described partnering with a local waste recycling company as an effective way to deal with waste. Other effective ways identified by learners include educating staff and students with a count of 26.9% (n = 53) respondents in Grade 9 and 31.1% (n = 68) respondents in Grade 12; hosting awareness campaigns with a count of 13.7% (n = 27) respondents in Grade 9 and 19.6% (n = 43) respondents in Grade 12; avoiding single-use and disposable items with a count of 11.2% (n = 22) respondents in Grade 9 and 16.0% (n = 35) respondents in Grade 12; setting up a compost project with a count of 14.7% (n = 29) respondents in Grade 9 and 12.8% (n = 28) respondents in Grade 12; and going paperless with a count of 3.6% (n = 7) respondents in Grade 9 and 8.2% (n = 18)

respondents in Grade 12. These results emphasise the important role played by schools in waste management (Mpuangnan *et al.*, 2023) and the effective management practices therein. Because proper waste management in schools ensures a healthy environment and promotes a sustainable future and contributes to achieving several United Nations Sustainable Goals, such as providing clean water and sanitation for all (SDG6), ensuring responsible consumption and production structures (SDG12), and reducing climate change and its impact through urgent action (SDG13) (UN, 2018).

Table 6: Effective ways of dealing with and minimising waste

			Grade (s)		
			Grade 9	Grade 12	Total
Effective ways of dealing with waste	Using designated recycling bins	Count	102	114	216
		% within Grade	51.8%	52.1%	
	Partner with a local waste recycling company	Count	88	81	169
		% within Grade	44.7%	37.0%	
	Educate staff & students	Count	53	68	121
		% within Grade	26.9%	31.1%	
	Hosting awareness & campaigns	Count	27	43	70
		% within Grade	13.7%	19.6%	
	Avoid single use & disposable items	Count	22	35	57
		% within Grade	11.2%	16.0%	
	Set-up a compost project	Count	29	28	57
		% within Grade	14.7%	12.8%	
	Going paperless	Count	7	18	25
		% within Grade	3.6%	8.2%	
Total count			197	219	416

4.2.2.5 Sources for Learning about Environmental Issues

Findings on the main sources from which learners acquire information about EE and waste management are indicated in Table 7 below. The overall number of participants recorded was 75.3% (n = 420) for this question. A great number of learners referenced

schools as the main source, with 71.7% (n = 142) of respondents in Grade 9 and 67.1% (n = 149) of respondents in Grade 12. Therefore, it can be concluded that schools under Pinetown District are well suited to implement and advocate for environmental education, thus increasing environmental awareness amongst learners.

The pattern followed with home amassing 18.2% (n = 36) respondents in Grade 9 and 19.8% (n = 44) respondents in Grade 12, municipality with 14.6% (n = 29) respondents in Grade 9 and 16.2% (n = 36) respondents in Grade 12, environmental organisation with 13.1% (n = 26) respondents in Grade 9 and 9.0% (n = 20) respondents in Grade 12, books with 19.2% (38) respondents in Grade 9 and 15.3% (n = 34) respondents in Grade 12, and other with 4.5% (n = 9) respondents in Grade 9 and 2.3% (n = 5) respondents in Grade 12.

These data sources indicated other ways that EE can be implemented and taught outside of traditional classrooms. It also highlights the important role and influences that local municipalities and environmental organisations can play in supporting curriculum-based EE in schools. For instance, students stated they learned and gained more experience about EE from mass media such as audio, printed and visual media (Altin *et al.*, 2014), which are often used by various government agencies and environmental organisations such as WESSA Eco schools' programmes, and SANBI.

Table 7: Sources for learning about environmental issues.

			Grade 9	Grade 12	Total
Sources for learning about environmental issues	School	Count	142	149	291
		% within Grade	71.7%	67.1%	
	Home	Count	36	44	80
		% within Grade	18.2%	19.8%	
	Municipality	Count	29	36	65
		% within Grade	14.6%	16.2%	
	Books	Count	38	34	72
		% within Grade	19.2%	15.3%	
	Environmental organisation	Count	26	20	46
		% within Grade	13.1%	9.0%	
Other	Count	9	5	14	
	% within Grade	4.5.%	2.3%		
Total count			198	222	420

4.2.2.6 Learners Willingness and Interest in Participating in Environmental Campaigns

To evaluate learners' awareness and knowledge, respondents were asked about their willingness, attitude, and interest in participating in environmental campaigns and project. The results in Figure 6 revealed that the majority of the learners do not participate in the celebration of environmental days in schools, as 93.4% (n = 183) of respondents in Grade 9 and 96.4% (n = 222) of respondents in Grade 12 indicated 'no', while 6.6% (n = 13) of respondents in Grade 9 and 3.6% (n = 8) of respondents in Grade 12 indicated 'yes'. In total, 74.9% (n = 418) of participants were recorded for this question. Based on the above findings, it can be concluded that the reason most learners do not celebrate environmental days, such as World Environmental Day, is because this event is not promoted and commemorated in schools by local municipalities, teachers, and/or environmental organisations. A study published by Olufemi (2010) revealed that more than half (60.2%) of the students were not aware that World Environment Day is celebrated every year on the 5th of June, which is disappointing because this day has been celebrated every year since 1972, led by UNEP, as a means of raising awareness about the importance of taking affirmative action to protect and conserve the environment. The absence of celebration can be attributed to a lack of resources, such as the teacher-to-learner ratio in the classroom, and a lack of knowledge about environmental days from teachers. The situation can be a barrier to policy development, implementation and environmental teaching because resources are needed to lower the teacher-to-learner ratio (Mashaba *et al.*, 2022).

It was also found that a majority of 75.1% (n = 151) of respondents in Grade 9 and 77.0% (n = 174) of respondents in Grade 12 have never attended any environmental program before, and a minority of 24.9% (n = 50) in Grade 9 and 23% (n = 52) in Grade 12 noted 'yes'. In total, 76.5% (n = 427) of participants were recorded for this question. These results highlight the importance of shifting from summative assessment of learning, which collects data to evaluate students' knowledge and skills usually conducted at the completion of a learning programme, for example, at the end of an instructional unit

through external standardised tests and a grading system (AERA, APA, and NCME, 2014), to formative assessment for learning. *Formative* assessment collects detailed information that teachers can use to improve ongoing instruction and student learning in real time (AERA, APA, and NCME, 2014). In simpler words, summative assessments are often viewed to be *of learning*, while formative assessments are for learning.

Furthermore, the results show that approximately 39.7% (n = 81) of respondents in Grade 9 and 39.5% (n = 90) of respondents in Grade 12 claimed to have been involved in a cleaning campaign or project. In comparison, 60.3% (n = 123) of respondents in Grade 9 and 60.5% (n = 138) of respondents in Grade 12 expressed a different opinion. In total, 77.4% (n = 432) of respondents answered this question. Therefore, it can be concluded that indeed gaps still exist between what is learned in the classroom compared to what learner's practise in the classroom (Mbokazi *et al.*, 2016), especially because South Africa is a member and cosignatory to several environmental treaty agreements and therefore expected to commemorate environmental days like World Environmental Week and many more (Nkalanga, 2013).

As learners' interest in attending environmental awareness and waste management were measured, the results indicated that approximately 90% (n = 181) of respondents in Grade 9 and 85.5% (n = 194) of respondents in Grade 12 revealed a positive attitude towards attending an environmental or waste-themed programme. On the other hand, only 10% (n = 20) of respondents in Grade 9 and 14.5% (n = 33) of respondents shared no interest. In total, 76.7% (n = 428) of respondents were recorded for this question. As a follow-up, results indicated that 77.8% (n = 154) of respondents in Grade 9 and 83.9% (n = 188) of respondents in Grade 12 expressed high interest in being involved in environmental campaign or project., while 22.2% (n = 44) of respondents in Grade 9 and 16.1% (n = 36) of respondents in Grade 12 showed a low interest. Overall, 75.6% (n = 422) of responses were recorded for this question.

The statistics relating to questions about learners' interest in attending awareness campaigns, and actively participating in projects, demonstrate confirm that learners are receptive, willing, and unprejudiced when learning and participating in environmentally

related issues and finding solutions. This indicates that learners exhibit positive attitudes towards the natural environment (Erhabor and Don, 2016). However, this can only be achieved through effective implementation of environmental education, where learners are properly taught and supported. To corroborate the above-mentioned argument, Mbokazi *et al.* (2021) emphasised the importance of allowing youth to participate in environmental awareness or waste management programmes and campaigns.

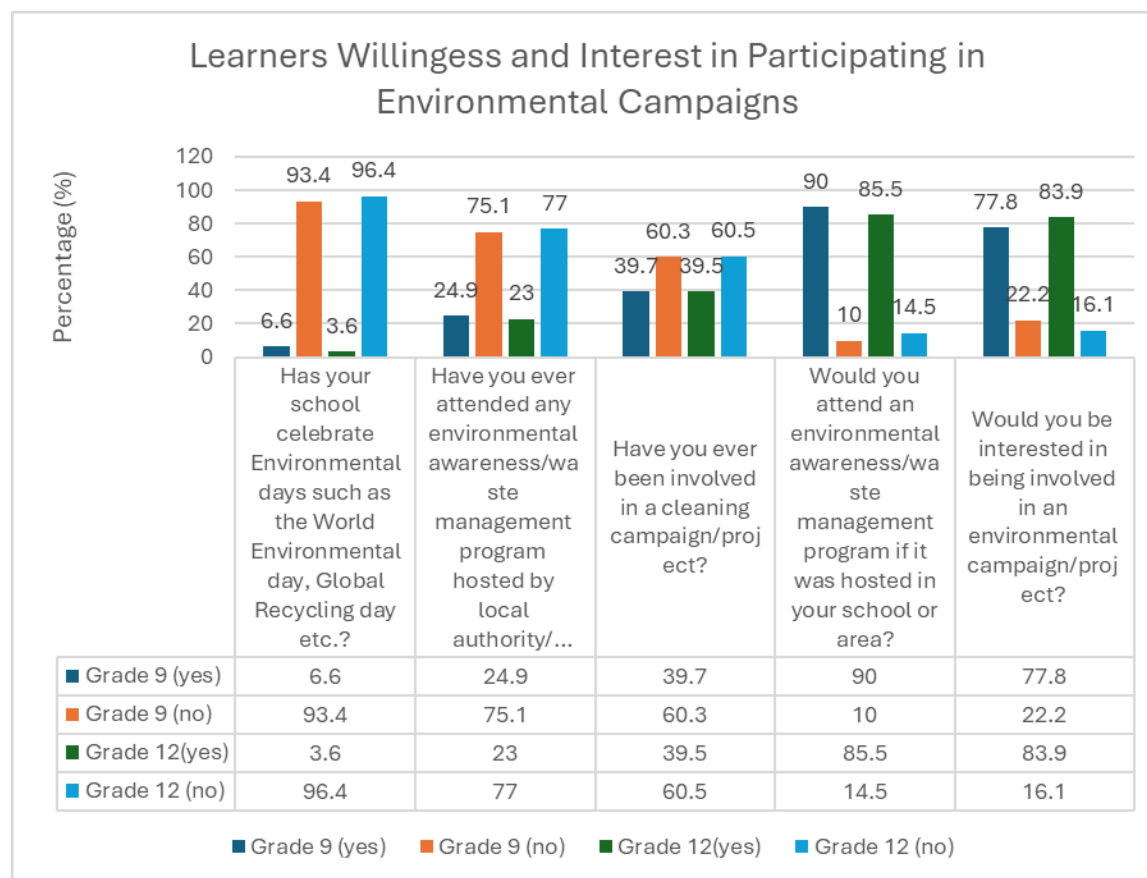


Figure 6: Learner's willingness and interest in participating in environmental campaigns.

4.2.3 Learners Attitude and Practice towards Waste Disposal

The data presented in this section provides results from Section C – of attitude and practices collected from respondents. Section C consisted of dichotomous questions, which required learners to select a 'yes' or 'no' response.

4.2.3.1 Learners' Understanding and Habits on Littering

The findings on learners' knowledge on the concept littering and their practical actions, such as picking up litter on school grounds or along the roadside, provide valuable insight into both their awareness and their everyday habits. The results show that 68.3% (n = 138) of Grade 9 learners and 73.7% (n = 165) of Grade 12 learners know the explanation of the term, while 31.7% (n = 64) of Grade 9 and 26.3% (n = 59) of Grade 12 learners do not understand what 'littering' means. In total, 76.3% (n = 426) valid responses were recorded for this item. The results related to learners' understanding of environmental issues and processes involved in the human–environment relationship, along with concepts such as littering.

On learners practice towards littering practice towards littering revealed that practice towards littering revealed that 48.3% (n = 99) of respondents in Grade 9 and 44.7% (n = 101) of respondents in Grade 12 reported that they pick up waste around their school or roadside. On the other hand, 51.7% (n = 106) of respondents in Grade 9 and 55.3% (n = 125) of respondents in Grade 12 do not engage in litter pick-up practices. The results indicate that the majority of learners under Pinetown District secondary schools have poor practices towards waste disposal, similar to a study conducted in Jaipur on knowledge, attitude, and practice regarding waste management among selected students' hostels in the University of Rajasthan, which reported less than favourable attitudes towards waste management practices (Arora and Agarwal, 2011). Additionally, the results highlight various reasons for littering, including value systems and personality traits, a lack of respect and care for the environment, an indifferent government, insufficient infrastructure and resources, the perception that littering and dumping create job opportunities, and a lack of education and awareness (Schenck *et al.*, 2022).

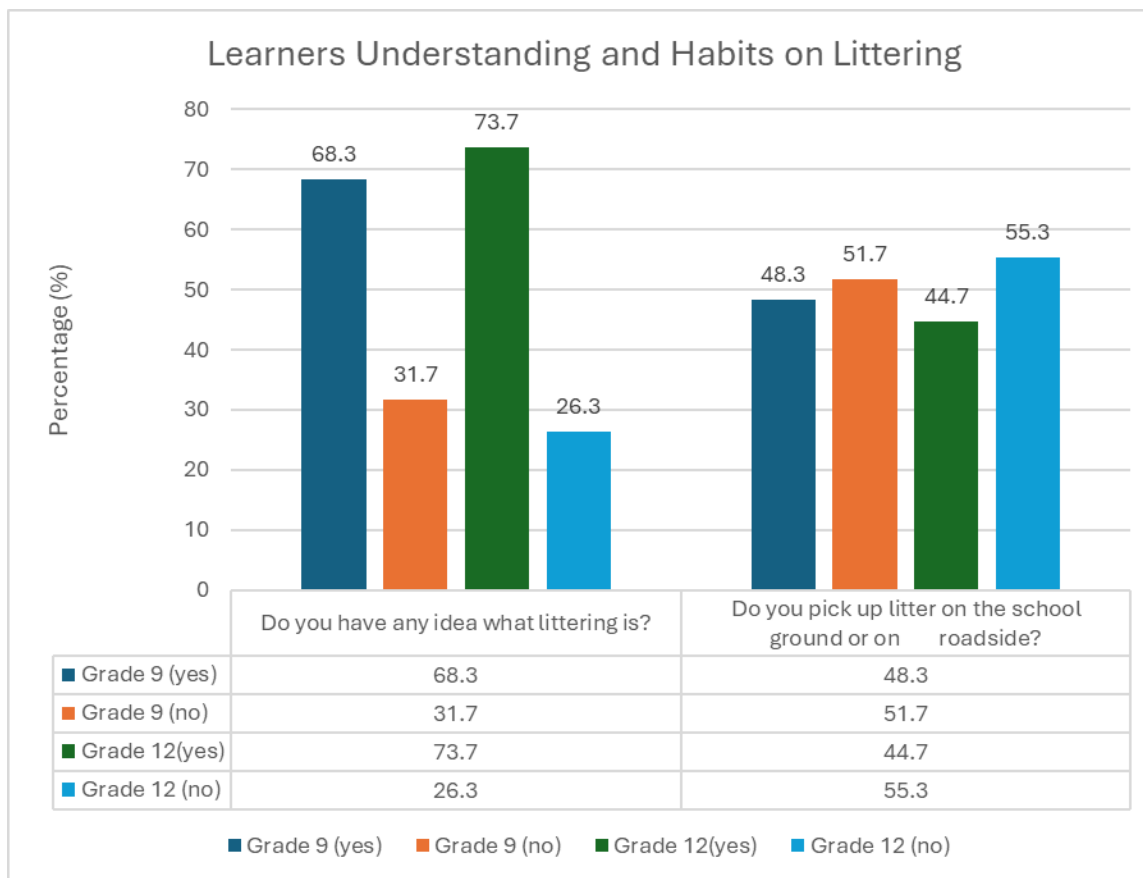


Figure 7: Learner’s understanding and habits on littering.

4.2.3.2 Learners’ Awareness and Understanding of the 4Rs in Waste Management

By understanding the waste hierarchy, the integrated waste management approach can cultivate learners’ sense of responsibility and desire to reduce, reuse, and recycle their waste materials (NEA, 2017; Ali *et al.*, 2021). Therefore, to measure learners’ awareness and understanding of the 4Rs, respondents were required to indicate whether they were familiar with the 4R term reduce, reuse, recycle, and rethink. Findings show that 37.3% of respondents (n = 76) in Grade 9 and (n = 85) in Grade 12 do not understand the concept of *waste reduction*, and 62.7% of respondents (n = 128) in Grade 9 and (n = 143) in Grade 12 indicated they were familiar with the term. In total, 77.4% (n = 432) of respondents answered this question.

Reuse, the second action in the waste management hierarchy, was assessed by asking respondents whether they understood the term. As illustrated in Figure 8, 77.8% (n = 158) of Grade 9 learners and 77.2% (n = 178) of Grade 12 learners indicated that they could explain the rephrased 'reuse' in the context of waste management, while 22.2% (n = 45) of Grade 9 and 22.8% (n = 52) of Grade 12 respondents reported unfamiliarity with the term. In total, 77.2% (n = 431) of responses were recorded for this item. After the reuse of products and materials, recycling is the third and most recognised action in the waste hierarchy (Medina, 2010). Respondents needed to indicate whether they understood the term 'recycling'. The results show that 82.4% (n = 169) of respondents in Grade 9 and 90% (n = 207) of respondents in Grade 12 know the term 'recycling', whereas 17.6% (n = 36) of respondents in Grade 9 and 10% (n = 23) of respondents in Grade 12 do not understand the term 'recycling'. In total, 78% (n = 435) of responses were recorded for this question. Overall, the results from Figures 8 indicate that the majority of the learners have knowledge of the terminologies related to the waste hierarchy, such as reuse and recycling; however, teachers and learners need to put more effort into teaching the vocabulary and factual meaning of the waste hierarchy and related terms. Findings also highlight the need for and importance of having basic knowledge of the 3R concepts (reduce, reuse and recycle), as the results showed a low level of awareness pertaining to the term 'waste reduction'. To support the above statement, Lalamonan and Comighud (2020) underscore the importance of ongoing education and awareness initiatives to promote responsible behaviour among youth.

Beyond the traditional 3R's, the concept 'Rethink' has been adapted by various stakeholders for the reconsideration of the entire waste management system (Bratkovich *et al.*, 2013). This phenomenon makes understanding the term 'rethink' an important reference; therefore, respondents were asked if they can define the term 'rethink'. The results revealed that 53.2% (n = 108) of respondents in Grade 9 and 42.2% (n = 97) of respondents in Grade 12 can define the word 'rethink', while 46.8% (n = 95) of respondents in Grade 9 and 57.8% (n = 133) of respondents in Grade 12 cannot define the same word. In total, 77.6% (n = 433) of responses were recorded for this question. Based on the results, it can be concluded that 'rethink' as an emerging concept is slowly

gaining recognition as part of the waste management hierarchy; however, a gap in knowledge still exists when comparing Grades 9 and 12 findings.

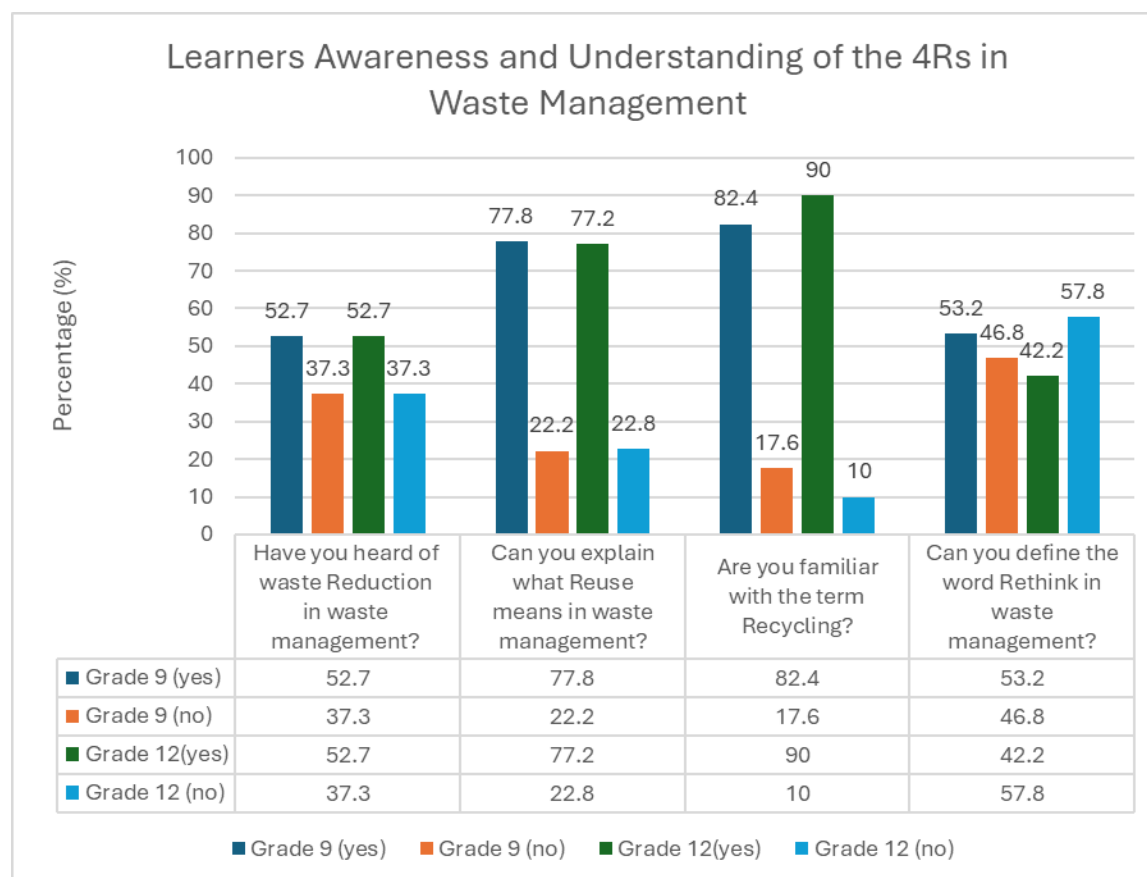


Figure 8: Learner’s awareness and understanding of the 4Rs in waste management.

4.2.3.3 Learners Attitude with Recycling and Litter Management

Most environmental issues stem from human behaviour, so it's vital to know what sustainable practices students have adopted and how widely they have. The results in Figure 9 indicate that the majority of 82.3% (n = 167) of respondents in Grade 9 and 66.4% (n = 152) of respondents in Grade 12 reuse and recycle their waste materials at school and at home. In contrast, 17.7% (n = 36) of respondents in Grade 9 and 33.6% (n = 77) of respondents in Grade 12 gave negative responses. In total, 77.4% (n = 432) of responses were recorded for this question. The results suggest that a substantial amount of the learner’s act in the interest of the environment; however, these results are

inconsistent with previous studies conducted within learning institutions. For instance, a study that investigated the recycling behaviour of students at the University of Johannesburg (Schoeman and Jiyane, 2021) revealed that only 30.7% of the students recycle, even though 91.5% of the students noticed recycling bins on campus grounds. The majority (72.9% and 70.1%) agreed that recycling is good and useful, respectively. This can be attributed to a suite of internal factors such as the perceived behaviour control effect, which means in shared spaces individuals tend not to participate in pro-environmental behaviour because of the view that somebody else will handle it, or students have no knowledge and/or were not told whose responsibility it is to carry out a sustainable action (Mtutu and Thondhlana, 2016; Thondhlana and Hlatshwayo, 2018).

It is fundamental to understand the recycling choices made by learners in schools and households as well as the factors that contribute to those decisions (Smith, 2020). This is why learners' waste disposal practices for collecting recyclables were investigated. The results show that half of the respondents, 56.6% (n = 113) in Grade 9 and 52.2% (n = 118) in Grade 12, collect recyclables at school and at home, while the other half, 43.5% (n = 87) of the respondents in Grade 9 and 47.8% (n = 108) of the respondents in Grade 12, do not collect recyclables. In total, 76.3% (n = 426) of responses were recorded for this question. The results signify the need for a paradigm shift towards attitudes, practices and moral principles, as Strydom (2018) agreed that shared awareness, injunctive norms, and knowledge of recycling initiatives, as well as available kerbside collection service for recyclables, positively influence recycling behaviour. For example, a communal Waste Collection Point (WCP) project in State Middle School initiated in 20-30 households as recommended by the Banda Aceh government found that schools practised waste segregation at source through the 3R hierarchy and benefited from the circular economy (Ridha *et al.*, 2019).

Scores related to learners' knowledge and participation in environmental activities and recycling companies outside of their schools are presented as less than half of the respondents, 34.8% (n = 70) in Grade 9 and 49.1% (n = 112) in Grade 12, participate and know recycling companies in their areas, while 65.2% (n = 131) of the respondents in

Grade 9 and 50.9% (n = 116) of the respondents in Grade 12 are clueless about any recycling companies in their area. In total, 76.9% (n = 429) of responses were recorded for this question. The findings indicate that learners have limited knowledge and information about companies that promote recycling; as a result, learners shy away from participating in recycling efforts and partnering with said companies (Altin *et al.*, 2014).

Learner's attitude is one of the waste management factors that influence the successful implementation of recycling initiatives in schools (Demir and Oteles, 2023). For this reason, respondents were asked whether they believe recycling is important in mitigating waste in their area. The results show that the majority of 95.1% (n = 195) of respondents in Grade 9 and 93.9% (n = 216) of respondents in Grade 12 had positive attitudes towards recycling as a waste minimisation strategy, while 4.9% (n = 10) of respondents in Grade 9 and 6.1% (n = 14) of respondents in Grade 12 had negative attitudes. In total, 78% (n = 435) of responses were recorded for this question. The findings emphasise the role of self-motivation and daily engagement when dealing with waste management (Tomas, 2024), as learners recognise the importance of recycling as a mitigation measure to reduce the harmful impacts of waste on the environment and human health. The results stand in line with the study of Xu *et al.* (2022), which explored the influencing factors and mechanism of green consumer behaviour, such as attitude, subjective norm, perceived behaviour control, and environmental indebtedness. The study found that environmental cognition, descriptive norm, and self-efficacy have a positive influence on green purchases.

Litter pick-up is one of the simplest ways one can teach learners about the culture of cleanliness in schools and communities (Brodowicz, 2024); hence, respondents were asked if they had ever participated in a litter pick-up day organised by their school. The findings demonstrate a high number of 78.3% (n = 159) respondents in Grade 9 and 78.6% (n = 180) respondents in Grade 12 remarked 'no', while 21.7% (n = 44) respondents in Grade 9 and 21.4% (n = 49) in Grade 12 remarked 'yes'. Overall, 77.6% (n = 432) of responses were analysed for this question. The findings show that schools under the Pinetown district do not organise or promote the litter pick-up day initiative. The

findings are similar to South African literature studies which affirmed indiscriminate littering as prevalent and a social concern at schools and communities (Nkambwe and Essilfie, 2012; Mboweni, 2020; Awshar, 2018; Matsekoleng, 2023). Another study that explored the effect of household and school practices of learners' environmental awareness towards waste found that a lack of programme and/or control measures to eliminate littering behaviour as well as cleanliness issues in the selected school included a shortage of litterbins and the absence of a litter pick-up duty schedule.

Based on the results, schools under Pinetown District lack environmental monitoring and evaluation tools such as anti-litter posters, wastebins, and incentives. A study by Matsekoleng (2017) had similar results; it found a lack of programmes and/or control measures to eliminate littering behaviour. These include a shortage of litterbins and the absence of a litter pick-up duty schedule. The study also found that the schools depend on hired waste cleaners and volunteers for the upkeep of school grounds, which is the main reason for learners' littering behaviour.

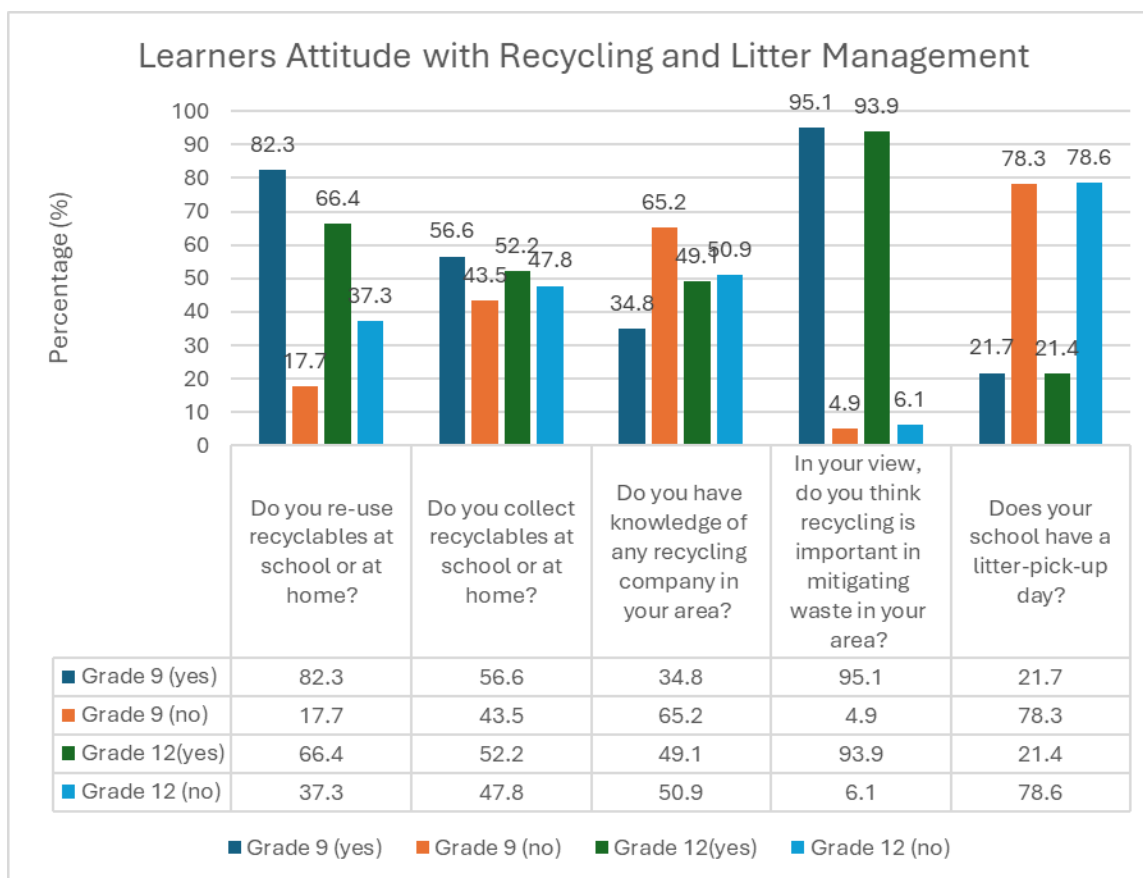


Figure 9: Learners attitude in recycling and litter management.

4.2.3.4 Provision of Waste Recycling Bins in School

Waste management in South Africa is a local government function of the National Treasury (2011). Considering the previous statement, respondents were asked to remark on the provision and availability of waste recycling bins in their schools. The results in Figure 10 indicate that the majority of 64.7% ($n = 132$) of respondents in Grade 9 and 71.9% ($n = 164$) of respondents in Grade 12 remarked 'no', while 35.3% ($n = 72$) of respondents in Grade 9 and 28.1% ($n = 64$) of respondents in Grade 12 remarked 'yes'. Overall, 77.4% ($n = 432$) of responses were recorded for this question. The presented results can be attributed to the absence and/or shortage of proper waste recycling bins in schools; for example, a study conducted at the University Technology Petronas found that 80% of the students and staff were interested in recycling practices; however, only 53% of the participants have actually practised recycling, and the reason for this was that 75%

of the participants were not able to find appropriate waste recycling bins and 83% could not find recycling bins around campus (Malakahmad *et al.*, 2010). Therefore, one can conclude that providing suitable and sufficient recycling bins would encourage positive attitudes and behaviour towards recycling. It would also create a conducive learning space where learners construct skills, knowledge, customs, and identity that can improve in addition to their endeavours (Marques and Xavier, 2020).

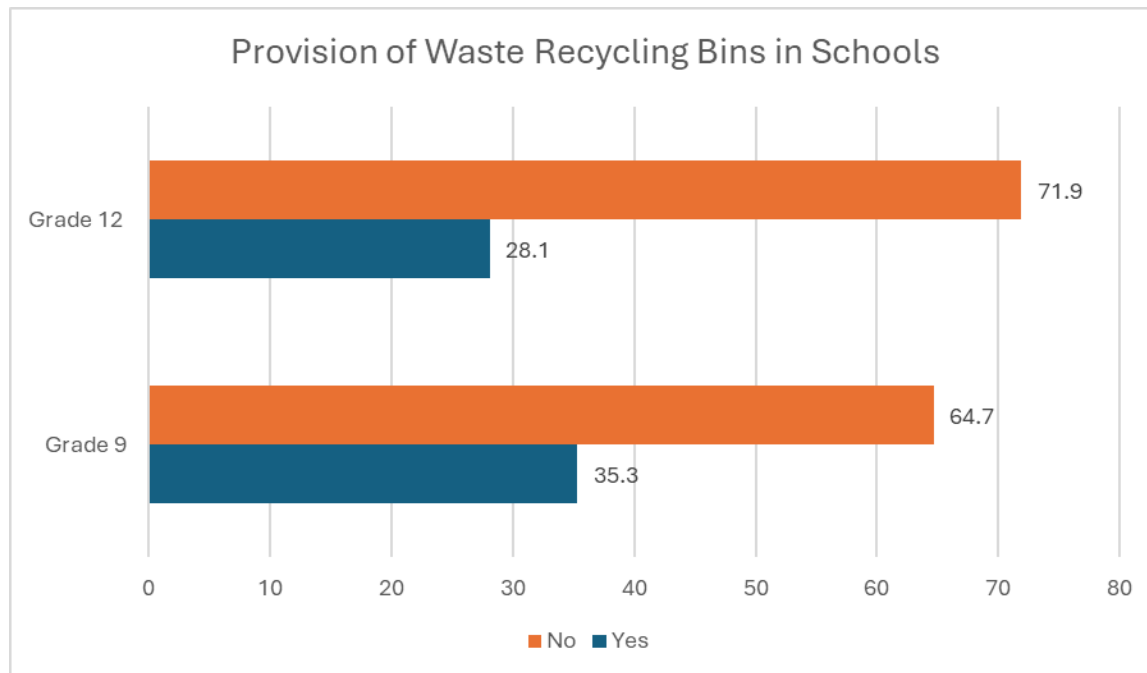


Figure10: Provision and availability of waste recycling bins at schools.

4.2.3.5 Type of Waste Generated in Schools

The most basic aspect of dealing with generated solid waste is knowing its composition (Miezah *et al.*, 2015); therefore, learners were expected to indicate the type of waste generated in their schools. Overall, 77.6% (n = 433) of responses were recorded for this question. The findings on Table 8 show the types of waste generated at the selected schools, which include paper, bottles, cans, food waste, and other non-biodegradable items. Paper emerged as the dominantly generated type of waste, with quantities of 93.7% (n = 192) in Grade 9 and 95.7% (n = 217) in Grade 12. The results were similar to a waste management study conducted in Zimbabwe, which revealed paper as the main

type of solid waste generated at schools (Chatira-Muchopa *et al.*, 2019). The results further indicate that the use of paper still prevails in schools despite the implementation of 3R (reduce, reuse, and recycle), which aims at going paperless and promoting sustainable use of paper. These findings feed the narrative by Bundhoo (2018), which states that less developed countries struggle with waste control due to ineffective waste management systems. Other common waste compositions generated were cans with a total of 6.3% (n = 13) in Grade 9 and 19.3% (n = 44) in Grade 12 and bottles, which had a total of 10.7% (n = 22) in Grade 9 and 22.4% (n = 51) in Grade 12. The results also show that food waste was amongst the identified generated waste in the school environments, which had a total of 15.6% (n = 32) in Grade 9 and 20.2% (n = 46) in Grade 12. Present findings conformed to a study conducted by Kuffour (2020), which showed a large amount of organic food waste discarded in a crude manner when it should be used as compost instead of being disposed of in a dumping site (Malakahmad *et al.*, 2010). The least identified waste composition was 'other', which had a total of 7.8% (n = 16) in Grade 9 and 7.9% (n = 18) in Grade 12.

Table 8: Type of waste generated in schools

			Grade 9	Grade 12	Total
Type of waste is generated in the school	Paper	Count	192	217	409
		% within Grade	93.7%	95.2%	
	Bottles	Count	22	51	73
		% within Grade	10.7%	22.4%	
	Cans	Count	32	46	78
		% within Grade	15.6%	20.2%	
	Food	Count	13	44	57
		% within Grade	6.3%	19.3%	
Other	Count	16	18	34	
	% within Grade	7.8%	7.9%		
Total count			205	228	433

4.2.3.6 Type of Disposal Method Used in Schools

The most crucial aspect after waste composition is waste treatment and disposal options used to dispose of waste (Al-Jarallah and Alesia, 2014). Therefore, the type of disposal methods used at school was investigated, and Table 9 indicates that among the five identified waste disposal methods, open burning and indiscriminate dumping are the most

prevalent environmental practices found across the study areas and, by extension, the Pinetown District. Open burning had a total of 65.7% (n = 132) in Grade 9 and 51.1% (n = 112) in Grade 12, while open dumping was ranked second with a total of 22.9% (n = 46) in Grade 9 and 26.9% (n = 59) in Grade 12. These results are comparable to a study by Bundhoo (2018), which found illegal dumping and open burning as the most prominent methods used in disposing of waste due to low and irregular waste collection.

A total of 13.4% (n = 27) of respondents in Grade 9 and 19.2% (n = 42) of respondents in Grade 12 identified recycling as another method used to dispose of waste, while 5.0% (n = 10) of respondents in Grade 9 and 14.6% (n = 32) of respondents in Grade 12 selected landfilling. Lastly, the composting method was identified by only 1.5% (n = 3) of respondents in Grade 9 and 3.2% (n = 7) of respondents in Grade 12. These findings prove that recycling and composting are hardly ever practised in and around Pinetown District secondary schools; this highlights the appalling situation of waste management in schools. This is because what is often referred to as a landfill site in most schools is an illegal dumping site (Adeolu *et al.*, 2014). Moreover, the lack of treatment facilities and the few landfill sites available are poorly managed; as a result, most people resort to indiscriminate dumping and open dumping (Hamilton-Akeke and Tel, 2017; Yoda *et al.*, 2014).

Table 9: Waste disposal method used in schools under Pinetown District

			Grade (s)		
Type of waste disposal methods used in schools	Open dumping	Count	Grade 9	Grade 12	Total
		% within Grade	46	59	105
	Burning	Count	22.9%	26.9%	
		% within Grade	132	112	244
	Recycling	Count	65.7%	51.1%	
		% within Grade	27	42	69
	Composting	Count	13.4%	19.2%	
		% within Grade	3	7	10
	Landfilling	Count	1.5%	3.2%	
		% within Grade	10	32	42
Total count			201	219	420

4.2.3.7 Responsibility for School Waste Collection

The results in Table 10 show who is responsible for waste collection at the selected secondary schools. Hired waste cleaners were identified by 71.4% (n = 147) of respondents in Grade 9 and 85.7% (n = 197) of respondents in Grade 12 as responsible for waste collection. This is not surprising, as learners usually dispose of their trash into waste bins if provided (Roy *et al.*, 2015) or litter due to their poor disposal habits (Daniel and Ibok, 2013). The waste disposed of in waste bins is then handled by hired waste cleaners and placed at waste collection points to be collected by the municipality. These findings are similar to a study that assessed waste disposal awareness, practice, and attitude (APA) of students from a South African university (Olufemi, 2010), which reported 31% of the students were not concerned about littered waste around campus, as this is the sole responsibility of the campus cleaners and not their duty.

The local municipality was identified by 14.6% (n = 30) of respondents in Grade 9 and 16.5% (n = 38) of respondents in Grade 12 as responsible for the waste collection in their school, and only 15.5% (n = 32) of respondents in Grade 9 and 5.2% (n = 12) of respondents in Grade 12 identified themselves as the responsible party for waste collection. This is because Section 156(1)(a) of the Constitution, read with Schedule 5, mandates the local government to take responsibility for waste removal, refuse dumps, solid waste disposal, and cleaning (National Treasury, 2011). A study by Bashir *et al.* (2020) also identified the local authority as responsible for waste management. The study also found that students were aware that local authorities send the waste they collect to landfill sites.

Table 10: Waste collection responsibility

			Grade (s)		
Waste collection responsibility	Learner	Count	Grade 9	Grade 12	Total
		% within Grade	32	12	44
	Hired waste cleaner	Count	147	197	344
		% within Grade	71.4%	85.7%	
	Municipality	Count	30	38	68
		% within Grade	14.6%	16.5%	
Total count			206	230	436

4.3 QUALITATIVE FINDINGS, INTERPRETATION AND DISCUSSION

This section outlines the findings gathered from teacher interviews conducted as part of the study. The interviews explored teachers' levels of awareness, knowledge, attitude, and practice for the purpose of evaluating EE and waste awareness programs in secondary schools within the Pinetown District, eThekweni Municipality, South Africa.

4.3.1 Qualitative Interview Findings

The qualitative findings in Table 11 outline the number of teachers who participated across selected schools within each CMC. In the Hammarsdale–uMhlathuzana Circuit, one teacher was interviewed at a school in the Mpumalanga area, and another at a second school within the same circuit. Under the Mafukuzela–Gandhi Circuit, one teacher was interviewed in the Inanda North area, and one teacher was interviewed in another school in the Inanda area. In the Durban Northwest Circuit, one teacher was interviewed in the Kranskloof area, while no teacher was interviewed at the school located in the Ntuzuma area.

Table 11: Number of teachers interviewed and participants per school

PINETOWN DISTRICT					
Circuit Management Centre	School(s)	Circuit	Locality	Number of Teacher(s) Interview	Codes
Hammarsdale-uMhlathuzana	School A	Mpumalanga	Urban	1	STA
	School B	Mpumalanga	Rural	1	STB
Mafukuzela-Ghandi	School C	Inanda	Urban	1	STC
	School D	Inanda North	Rural	0	STD
Durban Northwest	School E	Kranskloof	Urban	1	STE
	School F	Ntuzuma	Rural	1	STF

4.3.2 Respondent Overview and Introductory Findings

The data presented in this section provides results from Section A – introduction questions like the subject(s) the respondents teach, the grade the respondents teach, and the definition of the term 'environmental education'.

4.3.2.1 Learning Subjects with Environmental Education Content

Table 12 below provides results from Section A of the introduction questions, such as the subject(s) the respondents teach and the grade the respondents are responsible for teaching. According to the participants' responses, STA is responsible for teaching history in grades 8 to 12, social science in grades 8 and 9 and geography in grades 10 to 12 (when the teacher responsible for teaching geography is not available). STB is responsible for teaching geography in Grade 12, while STC is responsible for teaching history in Grade 11 and life orientation in Grades 9 and 11. On the other hand, STE is responsible for teaching natural science in grades 8 and 9, mathematics in grade 10 and life sciences in grades 10 to 12. Lastly, STF is responsible for teaching mathematics literacy in grades 11 and 12.

Interviews revealed that educators are responsible for teaching more than one subject in different grades or one subject in different grades, which provides teachers with the opportunity to implement EE across the curriculum in schools as per the new CAPS mandates (Mokhele, 2011). However, it is important to note that there are challenges that come with teacher-learner ratio (Jacob and Ndubuisi, 2020); for example, multi-grade instruction contributes to subpar teaching performance (Jamaldini *et al.*, 2022). In addition, teachers' course material is often limited to schoolbook curriculum that must be followed and lacks additional resource books that extend learners' knowledge (Mupa and Chinooneka, 2015).

Table 12: Subjects and Grade teachers' information

Subject(s)	Grade(s)
Variable Code: STA	
History	10 - 12
Social Science	8 & 9
Geography	10 - 12
Variable Code: STB	
Geography	12
Variable Code: STC	
Life Orientation	9 & 11
History	11
Variable Code: STE	
Natural Science	8 & 9
Mathematics	10
Life Science	10 - 12
Variable Code: STF	
Mathematics Literacy	11 & 12

4.3.2.2 Teachers Knowledge of the Term Environmental Education

Respondents were asked to define or explain what they understand of the term 'environmental education'; most of the respondents had similar understandings of the term 'environmental education'. These include respondents STA, STB, STC, and STF, who explained EE as teaching all individuals, whether young or old, about the environment and its surroundings, the negative impacts of environmental degradation, and solutions on how to treat our environment better, which is in cognisance with IUCN's definition (IUCN, 1970:70), where EE was defined as *"the process of recognising values and clarifying concepts to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings."*

Lastly, STE further explained EE as *"what the environment has, how can we take care of it and how can we conserve it, because the Earth is not for us only but for future*

generations also. Therefore, whatever we do has a direct impact on the animals, plants, climate, and almost everything.” This definition includes the fundamental concept of EE for sustainable development, as set forth in the Tbilisi Declaration (UNESCO-UNEP, 1978). Based on the above findings, the researcher concludes that teachers have general knowledge and understanding of the concept in question, as respondents mentioned principles of EE such as a shared value system, best practice in decision-making and a code of behavioural patterns regarding issues of environmental quality.

4.3.3 Awareness and Knowledge Questions

This section presents data from Section B, where respondents explained whether topics related to environmental education (EE) and waste management are integrated into the curriculum, the existing environmental policies in their schools, and the strategies used for teaching these topics.

4.3.3.1 Implementation of Environmental Education across the Curriculum

In section B, respondents were asked for specific subjects that deal with EE and awareness in the curriculum. Overall, respondents suggested that EE and awareness as a general concept were integrated within specific subjects of the existing curriculum, meaning teachers adhere to specific subject policy documents as required by the CAPS (DoE, 2011e). These subjects include social science, geography, life orientation, natural sciences and life sciences. Most respondents focused and commented on subjects that they teach as subjects that promote and encourage learning about the environment; only respondent STF, who is responsible for teaching Grade 11 and 12 Mathematical Literacy, highlighted the fact that the subject Mathematical Literacy has no content and/or concepts related to EE and awareness, as remarked, *‘No, but I think there's like Life Orientation, maybe.’*

The researcher understood the above response to mean that mathematics and mathematics literacy do not have any EE content because the subject mainly deals with calculation using contextual problems. Contextual problems are defined as real-life

experienced context problems in the Realistic Mathematics Education approach (Gravemeijer and Doorman, 1999; Pratiwi and Wadjajanti, 2020). However, upon further research, a study by Habibi (2014) found that teaching environmental mathematics education can make learners understand the environment better because of contextual problem calculations and can assist learners in developing their analysis, representation, modelling, and interpretation skills.

Respondent STC verified and reported Life Orientation in Grade 9 as integrating EE and awareness content and shared that the main topics covered include constitutional value and the concept of volunteerism, which focus on environmental organisations. According to the Department of Education (DoE, 2011f), Life Orientation covers five main topics, amongst which are the promotion of health, social and environmental responsibilities, and the constitutional rights and environmental responsibility of South Africans. Furthermore, the concept of volunteerism covered under the main topic of health, social and environmental responsibility includes sub-topics such as individual and community responsibility and different types of volunteer organisations: contributions of community-based and non-profit organisations to social and environmental health and sustainable development. Therefore, it can be concluded that indeed Life Orientation has integrated EE and awareness topics.

Respondent STA reported social science as the subject that informed learners about environmental themes, and the topics covered include a development studies chapter where you look at issues of pollution (water, land, and air) in urban and rural areas. This finding corresponds with the Department of Education (2002) policy document, which asserts EE and human rights education as an integral part of social science, which is a combination of history and geography in Grade 9. The aforementioned statement aligns with the social science learning statement (DoE, 2002), which encourages learners to pose and explore questions about society and their surrounding environment.

Respondent STB identified geography as a specific subject that covers EE topics such as settlement geography, climate change and pollution. As quoted, *"In some parts of geography, especially the settlement section, we have some few hints about*

environmental studies such as soil pollution." To understand the statement made by respondent STB in a more profound context, other related topics under environmental studies include natural resources, ecosystems, energy resources, biodiversity, pollution, and solid waste management (Sadiku *et al.*, 2020). Additionally, a study that investigated CAPS documents as well as examination papers written between 2012 and 2015 found that geography examination papers had environmental-impact topics such as negative impacts of climate change, biodiversity loss, river pollution, drought, land degradation, health hazards caused by mines, impacts of overpopulation in urban areas, and effective farm management of riverbanks (Msezane, 2017). However, there is general, but not complete, alignment between policy and examination papers, and there is limited focus on EE, which restricts pro-environmental behaviour among learners.

Natural Science, which forms the basis of further studies in specific disciplines such as Life Science (DoE, 2011e), was reported to include EE content. Respondent STE mentioned that natural science talks about the diversity of living and non-living organisms and their dependence on each other. Life Sciences as a continuation subject of Natural Sciences was also reported by respondent STE, who stated that *"For Life Sciences we have environmental studies where we teach about human impacts, pollution, and neutral cycles."* The Department of Education (DoE, 2011d) policy document shows that life sciences involve various sub-disciplines, like environmental studies, introduced to varying levels to provide a broad perspective of the subject.

4.3.3.2 Implementation of Waste Management across the Curriculum

As a sequel to the question about the inclusion of environmental-impact topics, respondents were asked whether the curriculum covers waste management as a topic and how it is taught. The participants responded in a similar fashion regarding the implementation of waste management in the curriculum. All participants revealed that waste management as a topic is not integrated into the curriculum. STA gave a response based on the subject they teach, namely history and social science, and said, *"The history or social sciences curriculum doesn't address waste management; therefore, it wouldn't be one of my subjects. So, it is a 'no'"*, while STB emphasised saying, *"There is no waste*

management topic in our curriculum at the moment.” These results indicate the fact that despite various initiatives enforced by the government, such as the National Waste Management Strategy policy document, which set a goal to ensure that people are aware of the impact of waste on their health, well-being, and the environment (Goal 4), through the short-term (5-year) targets of 80% of municipalities running local awareness campaigns and 80% of schools implementing waste awareness programmes (DEA, 2011:7), the government has failed to implement the majority of its action principle.

4.3.3.3 Environmental Education as a Subject on its Own

Respondents were required to voice their views on whether EE deserves to be a subject on its own. 80% of respondents think EE should be a standalone subject, not integrated into other subjects. Respondents STA, STB, STC, and STF believe that since EE is required to be integrated into all other subjects during class lessons, which indicates its importance, it should be made an independent subject. Mostly because learners are still not aware of the negative impact on the environment, despite the mandate of the Department of Education, which moved EE into formal education, not as a subject but as a theme to be included across all subjects. Therefore, it can be deduced from the above statement that EE being integrated into other subjects is not sufficient because there's more content and topics of EE that need to be covered.

Respondent STE was the only one who believed that EE should be inclusive in all subjects because geography teachers are the most expected to teach it. Respondent STE said, *“I believe it should be included in all subjects to create awareness. It shouldn't be teachers who are teaching geography only who are focusing on environmental topics. Because I know in geography, they go into depth when it comes to environmental studies, but if a learner is not doing geography, that means that learner will not know if they are not curious. They are not aware of the environment and how to take care of it, so it should be inclusive. It should be part of inclusive education.”* This statement highlights the burden that is often placed on geography teachers due to the belief that geography has more content and topics that relate to EE compared to other subjects (Ndzimbomvu *et al.*,

2021). Scholars are in broad agreement that studying geography as a core component of mainstream schooling can contribute to sustainability education.

4.3.3.4 Environmental Education Teaching Responsibility in Schools

For several decades, environmental responsibility has been an issue of concern in the field of EE (Aarnio-Linnavouri, 2019). As a result, respondents were questioned about who should be responsible for teaching EE in schools. Respondents shared different views, including individual and collective personnel such as teachers, conservation bodies, local authorities, and various government agencies. STA believes that teachers are key players in disseminating information related to EE as guided by the curriculum, as comments made were *“In schools it should be teachers, but the teachers follow the curriculum delegated by the government, and for the teacher to teach it, the curriculum needs to be there. It should tell us what to teach, when to teach it, and how to teach it.”* These findings are similar to a study conducted by Ruthanam *et al.* (2021), which mentioned that in the South African school environment, teachers are the promoters and developers of the key outcomes of EE, which are knowledge, awareness, attitudes, skills, and participation. Therefore, teachers are transmitters of knowledge and have the responsibility to raise learners’ environmental awareness (Urbanska *et al.*, 2022).

STB believes that *the* Department of Education is responsible for ensuring learners are taught environmental education, which can be done by training personnel that will only teach in schools; however, Manolas and Tampakis (2010) point out that the education system is least responsible for environmental problems but instead is a channel for positive contribution. From a holistic perspective, STC believes that a coordinated approach by each government sphere is required, as explained by *“I think it is all spheres of government, meaning national, provincial, and municipal. National from an educational point of view, as in the Department of Basic Education, and municipal because they are the people who are on the ground with the community, and so I feel like they can engage in education or environmental education and environmental awareness at schools, communities and their leaders and councillors.”* Additionally, taking a holistic approach can prevent numerous problems related to waste, as STC further stated *that*,

“Environmental education could curb a lot of issues; for instance, at the municipal level, due to littering, everything is washed off into the drainage system during rains, which results in clogged drains.’ So, I feel like if they did more environmental awareness, campaigning and education, they would spend less on fixing problems.”

Others, such as STE and STF, were not specific on who is responsible for teaching EE in schools but mentioned that it should be a collaboration from a group of individuals such as households, businesses, community organisations, NGOs, schools, parastatals and the three spheres of government. This finding supports the notion that EE requires a collective effort, as a study written by Mathenjwa (2014) collectively revealed that the majority of activities in EE in the Ubombo Circuit in KwaZulu-Natal were realised by various nongovernmental environmental organisations such as Ezemvelo KZN Wildlife and WESSA. The activities involved eco-school competitions and tours to game reserves and nature centres.

4.3.3.5 Teachers’ Knowledge concerning Environmental Policy in Schools

The Department of Education emphasises that schools must have environmental policies such as NEMA that empower teachers to implement cross-curricular teaching and learning of EE in schools (Buthelezi, 2015; Rosenberg, 2008; Fautley and Jonathan, 2011). Some of the teachers interviewed revealed that environmental policies in their schools are non-existent; these are respondents STF and STA, who revealed that there are no policy documents or posters that promote EE in their schools. Some respondents highlighted a common unwritten rule or code of conduct and/or poster that forbids learners from littering, such as STB, who noted, *“Not exactly, but on the school gate there’s a board that mentions that learners should not litter in the school.”* In turn, STC admitted that, although there is no available policy document about the environment, an unspoken rule about littering around school premises is enforced. *We do not have a policy that is title specific to environmental education or environmental awareness. What we do have is an unspoken code of behaviour that they are not allowed to litter; however, we see flowers of paper and plastic all the time.’*

Lastly, STE confirmed that their school does not have a specific policy regarding the environment; however, they do participate in climate change projects, stating, *“I wouldn’t say we have a policy, but we do take part in climate change projects because we’ve been involved with KIC: CEE.”* With researcher probing, STE further explained that, *“KIC: CEE project – Keep It Cool: Climate Change Education – was a project that deals with climate change, the impact of global warming, and the greenhouse effect. Schools were required to create awareness – in our school there was a debating team, and we had to compete with other neighbouring schools. The school also had a garden to teach learners how to take care of the environment. We also had a recycling initiative where all the littering in the school – the papers, the glasses, the cardboard – was recycled and not thrown away. Food was composed of the garden to increase nutrients. But not all the grades were involved because we use Grade 8s and Grade 9s because they have a simpler curriculum, as it is not tight compared to Grades 10, 11 and 12. The project was a pilot project from the Department of Education, started in 2020 and ended in 2022; it was piloted in 20 schools under the Pinetown District, and our school was part of it as well.”*

The findings show that most schools lack policy guidelines and general statements designed to ensure the effective implementation of EE in school. As a result, schools face significant challenges in participating in EE-related matters. The results of this study differ from most studies; for example, the teaching and learning of EE in Hillside Primary is supported by several existing policy documents that assist teachers in achieving a desired learning outcome, such as the interpretation guidebook for the RNCS, titled Enabling an Environmental Focus on Social Sciences, Technology, or Arts and Culture (Mokhele, 2011). In this document teachers are given examples of how to develop lesson plans for different learning areas, using environmentally related teaching goals and assessment standards from the RNCS.

These results also highlight the important role played by collaborating with other schools or community projects. This can assist learners to see the impact they can achieve through tangible and relatable practical ideas across the curriculum while creating a multifaceted approach that makes EE relevant and empowering (Hudson, 2023). Another

study that aimed to investigate whether plastic pollution issues are being integrated into South African primary and secondary schools (Dalu *et al.*, 2020). The study found a significant difference between primary and secondary schools, as well as variations in teachers' responses regarding environmental policy, the code of conduct, and the enforcement of the plastics ban policy.

4.3.3.6 Schools' Involvement in Hosting Waste Management Campaigns and Awareness Projects

The interviewed teachers responded in various ways when questioned whether their schools have initiated or hosted waste management and awareness campaigns or projects in previous years; answers ranged from yes, no, and clueless. STE and STC both agreed to hosting an environmental campaign. STE divulged that, *"Yes, last year (2022) we were in partnership with a neighbouring school, and we did a Creative Arts event. Learners were talking about indigenous plants and the need to conserve them because they are medicinal. It was a play that included waste management, teaching the fact that we're not supposed to litter, but we are supposed to recycle. In fact, recycling was the emphasis."* Meanwhile STC confessed that, *"We started before COVID. We did a paper recycling campaign, and then from there we started collecting papers as a school. There is a little area where they put a recycling bag for paper and boxes. So, there is a big bag that comes, and we load everything up, and then they take it to a recycling plant."* A similar campaign called the Green Campus Initiative (GCI) was implemented by the Durban University of Technology (DUT) and the Student Housing and Residence Life, in partnership with the Vuna Leadership Academy at the Durban University of Technology and DSW (Twala, 2022). The objective of the campaign was to emphasise the significance of initiating such campaigns in times where the world is dealing with rapidly increasing environmental problems. In conclusion, the research findings show the urgent need for schools to support and extend existing environmental initiatives.

In contrast, STA revealed a different reason why their schools have not taken environmental initiatives. STA believes that SMTs (School Management Teams) are responsible for drafting and enforcing policies that will promote collaboration between

schools, SGBs (School Governing Bodies), and parents. This is because School Management Teams are responsible for overseeing the daily activities in the school and need to support teachers in imparting knowledge to the learners (Molefe, 2013). STA further shared that schools do not see the importance of organising or participating in environmental initiatives, especially waste programs, because there is a person already hired to pick up waste on school grounds.

A study that supports the notions of a collaboration is that of Pop *et al.* (2013), which developed a three-phase awareness campaign (collecting information, training, and monitoring) through the involvement of public authorities, a sanitation company, local NGOs, and environmental science learners. The findings showed that 70% of the schools in Cluj-Napoca improved their theoretical knowledge related to waste management, the environmental impact of waste disposal, and practical challenges concerning the waste management hierarchy. Respondents STF and STB, who have worked less than two years for the schools, mentioned that since joining the schools, they have not seen any environmental initiatives taken by the schools, meaning they do not know what has been done in the last years.

4.3.3.7 Schools' Participation in Waste Management Awareness Campaigns and Projects in Partnership with Local Company

A fundamental component of any EE programme, especially waste management initiatives, is shared awareness and participation. This is why the researcher asked respondents about the extent to which their school has actively engaged in waste management and awareness campaigns. Out of five schoolteachers that were interviewed, four confirmed to have participated in awareness campaigns and projects focused on waste management. STA announced, *"It was Enviroserve, which controls and manages a landfill in Inchanga. It was an awareness campaign about waste,"* while STB elaborated by saying, *"the one that I heard about when I came to this school was Columba Leadership Academy, but in recent years it has not been active, but they did more than five years ago."* Upon further investigation, the researcher found that Columba Leadership Academy is a non-profit organisation founded in 2009 that engages with South African

high schools and focuses on educational administration programs by working closely with the Department of Education (Columba, n.d.).

According to STB and STC, their schools recycle for financial incentive and contribute to the circular economy, a model of resource production and consumption which includes sharing, leasing, reusing, repairing, recycling, and redistributing existing materials and products for as long as it is environmentally, technically, socially, and economically possible (European Parliament, 2023; Hahladakis and Lacovidou, 2019). Respondent STB professed that the school recycles papers, and a middleman collects the materials, takes them to a recycling company, and gives the school 40% of the procured income, while STC disclosed that the school partnered with a recycling company based in Phoenix, and the school buys flypaper for answering examinations with the proceeds from recycling.

Lastly, STE opined about an internal awareness campaign their schools initiated; STE elaborated, saying, *“Yes, we had one where it was a presentation in the assembly for the learners by learners. They were telling their fellow learners that they are not supposed to be part of the problem, but they are supposed to be part of the solution.”* STE further explained that the campaign focused on promoting sustainability, as quoted, saying, *“If we are not taking care of our environment, the environment will not be able to take care of us or to sustain us. This falls under sustainability education and promotes sustainable development goals.”* This indicates that educational collaboration between teachers, NGOs, government, and citizens can be a network of information distribution and a platform that sets and implements sustainable waste and recycling initiatives (Kumar and Kumar, 2020). Only STF gave different views, as *“I am not sure, but there is someone who comes here and picks up waste, but I don't know where they take the waste to. So, I am not sure.”*

4.3.3.8 Involvement of the Local Municipality in Hosting Waste Management and Awareness Campaigns in Schools

The role of different spheres of government in the implementation of waste management awareness campaigns and projects is important and cannot be ignored, as informed by the Constitution of South Africa. Few of the respondents vouched that the eThekweni local municipality has organised and hosted a waste management and awareness event, campaign, or project. STA communicated that *“The eThekweni Municipality came with the Department of Parks and Recreation a few years back, and it was a waste awareness campaign.”* In a similar sense, STE reiterated that *“Yes, it was in September last year; we partnered with the local municipality. There were speeches about environmental conservation, how we can take part as teachers, as learners, as a community and in schools.”*

Opposite to what was recorded as said by STA and STE, respondents STB, STC, and STF gave a resounding ‘no’ as a response. STF highlighted the stigma attached to waste management jobs or initiatives, as quoted, saying, *“No, you know it is a shame because sometimes learners look down on people who recycle waste.”* This is because waste picking is not deemed a formal occupation; therefore, waste pickers are seen as a social problem, which leads to stigmatisation and discrimination (Porter, 2015; Porras and Climent, 2018; Porras Bulla *et al.*, 2021). As an illustration, the Wittemer and Parizeau (2018) study revealed that waste pickers often face negative reactions and judgement for working and handling waste. On the other hand, STC directly said, *“No, the focus is on violence and drugs,”* identifying other issues that require government intervention in schools. It seems local municipal councils lack interest and expertise in effectively developing and implementing EE programmes to support teachers and learners in schools. As support for the above statement, the Department of Environmental Affairs (DEA) document asserts that appointed representatives and departmental officials, especially at government level, demonstrate poor awareness concerning the importance of waste management (Africa, 2010; DEA, 2010).

4.3.3.9 The Role of Education and Schools in Waste Minimisation

Many studies have emphasised the important role played by education and schools in increasing learners' knowledge concerning environmental waste impacts and encouraging responsible waste management habits among learners (ISWA, 2016; Prasetiawan and Wasisto, 2021; Nurmayanti *et al.*, 2022). For this reason, respondents were asked to voice their opinions about whether they agree or disagree with the above research-evaluated article statements. All respondents, including STA, STB, STC, STE, and STF, unanimously agreed that schools have a role to play in waste management education (Kalambura *et al.*, 2015:1). Among the various responses from participants, STB explained, saying, *"Yes, a lot, because most of the people who litter around the community are learners, and if they can get effective education on how to prevent that, then they can play a very good role in the community and in protecting the environment."* These findings are comparable with a content analysis study conducted by Coskun and Edward (2020), who intimated that a school community is a great educational agent to continuously actualise the biosphere stability for current and future generations.

Others reiterated the commonly stated fact that environmental themes ought to be included in the school subjects at every level in school communities because the development of education is associated with teachers (Amare and Dagneu, 2020; Draraz *et al.*, 2023), like STA alluded to when it said, *"Well, the answer is yes, because teachers are the ones who teach learners about the impact or dangers of poor waste management. Therefore, if we teach them, they will be more informed, thus making them aware."* This means education cannot be overlooked as an efficient tool and platform that positively influences learners to develop consciousness and apply their knowledge through practice towards all affairs concerning waste management (Nurmayanti *et al.*, 2022).

4.3.4 Attitude and Practice Questions

The data presented in this section provides results from Section C aimed at finding out whether schools and local municipalities have played a role in hosting awareness

campaigns for waste management or projects and if schools have collaborated with local companies to support recycling.

4.3.4.1 The Implementation of Environmental Education Training and Workshops by Schools or Local Authorities

For section C, respondents expounded at length about whether they have attended an EE and awareness training or workshop organised by school or local authorities. Two of the participants shared a similar idea with STA, saying, “*Yes, it was the principal who attended training, and I remember it was Enviroserve who initiated it yet again,*” and STB said, “*I think our deputy principal once attended a training session with Columba Leadership Academy about 3 or 4 years back because there were pictures showing attendance, and then there was a certificate in the office.*” The findings show that training was attended by school principals and not teachers, meaning the principals had an opportunity to host and initiate their own training in their schools for teachers and impart knowledge to teachers who will then impart that knowledge to learners; however, it was a missed opportunity. The findings also highlight the importance of collaboration between stakeholders such as private companies (in this case, Enviroserve) and government agencies (in this case, Columba Leadership Academy, which is closely associated with the Department of Education) to support EE initiatives in schools.

STC and STE highlighted the important role that higher education institutions can play in producing teachers that are well-informed about environmental education. Both respondents acknowledged attending an EE training hosted by the University of KwaZulu-Natal (UKZN) at their own capacity. The result outlines the extraordinary importance of EE in higher education (Klika and Kasnickova, 1984: 21) as universities often hold a reputable position of leadership in teaching and learning and in research and technology (Sharma, 2015). For example, a study that evaluated pre and post surveys of teachers and learners found that few of the teachers were not knowledgeable about plastic pollution before attending a plastic training, however after training teachers and learners had better awareness of plastic related problems resulting in changed perception and action (Kowalski, 2016).

The results also indicate that while increasing efforts and initiatives to provide various environmental courses and programmes is a significant push towards EE advocacy, such initiatives have worrying limitations (Mumtaz *et al.*, 2021; Valle, 2023). This is because many of the environmental courses are often reserved for environmental majors like biology, environmental science or management, therefore inaccessible to other fields of study majors (Valle, 2023). Additionally, the South African government and the Department of Education are responsible for developing, implementing, and monitoring EE, focusing on producing competent teachers for learning areas such as mathematics and physical science while neglecting and failing to produce competent teachers who are experts in the field of environmental education. This can be attributed to the limited number of higher education institutions that offer EE courses during professional teacher training; these include the Universities of South Africa, the University of Johannesburg, the University of Zululand, Rhodes University and Stellenbosch University (Mathenjwa, 2014). Therefore, the curriculum in existing teacher education courses should be revised and updated in a way that there should be due weightage for the study of EE as an independent subject or outline suitable methodology when integrated into other subjects (Ramesh *et al.*, 2023).

Additionally, STE elaborated that their school has no budget for initiatives related to environmental education but has a budget for administration, electricity, and water. Therefore, to participate in environmental initiatives, the school often depends on sponsorships and donations from the school governing body, parents, businesses, the municipality, and environmental organisations. For example, the school partnered with WESSA for a gardening project and was sponsored with seeds, compost, gardening tools like shovels, wheelbarrows, and gloves.

4.3.4.2 Teachers' Interest in Attending Environmental Education Training and Workshops

As a follow-up question, respondents were asked if they would be interested in attending environmental awareness or waste management training or workshops organised by local authorities or the school. All respondents gave favourable replies, as STA validated the

response starting, *“Yes, I for one, would not have a problem with attending because it is enriching, and I would then impart that knowledge on learners.”* STB and STF gave identical answers, with STB disclosing, *“Yes, this would be beneficial for me to have a basic understanding of environmental education,”* and STF corroborated by saying, *“Yes, I would because I think it would be very beneficial for me and for the learners and the people around the school.”* The findings reveal that the school and relevant stakeholders must fully endorse and introduce the teacher training initiatives (Eliyawati *et al.*, 2023) at educational institutions because the advancement of education can be increased through the professional development of teachers (Padretti and Nazir, 2013).

4.3.4.3 Government Effort in Implementing Waste Awareness Programmes in Schools

The key role played by the government (national, provincial, and local) in the implementation of legislation and waste awareness initiatives in schools cannot be overemphasised; a clear division of position, responsibilities, and binding obligations for the three spheres of government have been established. Hence, respondents were asked whether they believe the government has applied the required effort in implementing waste awareness programmes in schools. Interviewed teachers felt that the government has not done their utmost best in initiating and supporting waste awareness programmes in schools. Respondents STA, STB, and STC believe the government is not doing its best effort in implementing waste awareness programmes; STA said, *“No, there is no effort whatsoever because the eThekweni Municipality, together with the Department of Parks and Recreation, came a few years back. This was like 3 or 4 years back, and that was long ago. Hence, I am saying there is no effort there, as they should be doing awareness programmes at least annually. So, even the government itself does not follow their own policy regulation.”*

STB echoed what was said by STA, highlighting the limited knowledge, awareness, poor attitude and practicality in schools, as well as the lack of legal penalty should teachers fail to implement environmental education. The findings from STA and STB give the impression that teachers believe they do not get sufficient support from the government

– Department of Education. In reviewed studies, it has been recognised that the government has, to a certain extent, tried to implement waste awareness programmes in schools. For example, the government is ramping up a green campaign to advocate for pro-environmental behaviour and instil responsible practices (Currin, 2023). The programme involves a spectrum of partners with the aim of shifting people's mindsets and actions while keeping their surroundings clean, green, and safe. Moreover, the results of a study seeking to understand the perceptions of municipality officials on the role of local government in innovation in the context of waste minimisation showed that 95% of the respondents agreed that the local government has implemented waste recycling and reuse initiatives to some degree (Mutereko *et al.*, 2023). These initiatives include the Cleanest Municipality Competition (CMC), Waste Economy Support Programme (RESP), and Operation Phakisa Recycling Enterprise Support, which focuses on recycling initiatives concerning waste minimisation, waste collection and beautification of living spaces. However, a feasibility outcome report suggested that various stakeholders tried to shift South Africans' throwaway culture to a sustainable waste culture; however, these efforts remain uneven and inconsistent across time and geographical divides (SALGA, 2022).

STF opined, saying the government fails to apply the required effort in implementing waste awareness programmes in schools due to various responsibilities that need government attention and resources, such as gender-based violence, teenage pregnancy, and the lack of interest from community members to assist and work with the government to solve environmental problems. These sentiments were also reported by CSIR (2011), stating that awareness innovation must be a continuous process to be effective and needs to be relevant to the targeted audience, but this level of detail is lacking due to many other responsibilities that municipal officials must deal with.

4.3.4.4 Main Challenges of Implementing Waste Awareness Programmes in Schools

The research findings revealed various challenges exist and transcend beyond geographical divides as they pertain to the implementing of waste awareness programmes

across school curriculum. These include lack of resources and funds, shortage of teacher training and workshops, lack of collaboration between major stakeholders, time constraints, and School Management Team and teachers' attitude towards the implementation of environmental education. As mentioned earlier, STA reiterated about school management's poor attitudes, argues that *"The main challenge is that the School Management is oversaw by an older generation, therefore some of them do not believe in environmental education and climate change, while others do not basically care. So, if a person does not care and does not believe in said a cause, obviously they would not implement it. Because they see it as less important, they focus on other stuff which deals more with academics like Physical Sciences and Mathematics. They see it as a waste of time and a waste of resources and energy. That is the main issue for most schools, including this school, hence the school finds it difficult to implement anything that deals with environmental education."*

Similar results were reported by Ruthanam *et al.* (2021), where teachers perceived embedding EE within Life Skills as less important compared to other subjects, for example, one teacher appeared to place more value on Mathematics and English subjects. Another teacher from the same school revealed they would not go above expectation in using their creativity for a subject like Life Skills (which is a subject meant to promote environmental education), whereas they would put more effort into subjects like Mathematics or Science. Reinforcing this perspective, is a study by Ralph and Stubbs (2014) which mentioned that the focus on academic silos and working across disciplines were main barriers that prevent the system-level required in promoting sustainability.

STB attests to the notion that schools tend to focus on the traditional approach that neglects the multidisciplinary approach adopted by CAPS document which promotes EE themes to be incorporated into content areas of other traditional subjects (DoE, 2011a). However, even the multidisciplinary approach is proving difficult to infuse EE into existing school subjects in accordance with its relevance to the content coverage and teaching of each school subject (Ramesh *et al.*, 2023). When the researcher inquired about what can be done to resolve this problem, STB and STC recommended that the Department of

Education should implement EE as a subject on its own and make it legally binding for teachers to teach it, so that it compulsory for learners to engage and participate more in EE matters. STC further emphasised the need of providing teacher training, as teachers are the main people that are responsible for teaching EE topics. A study with similar findings is that of Mokhele (2011), which argued that most government schoolteachers lack ideas or initiatives to successfully implement EE because they are not trained on how to effectively integrate EE in their instructional hours. The study also discovered that although schools in the Mpumalanga Province have implemented the national education policy, the two participating schools had implemented the same policy differently because of limited understanding and knowledge of the policy.

Respondent STE and STF also identified lack of partnership, in addition to poor attitudes, and resources as barriers for implementing waste awareness programs in schools. STE pointed out that because of poor attitude towards environmental issues, it is often difficult to convince individuals whether learners, teachers, community members or even getting support from school management to engage in environmental initiatives, as they regard environmental issues as less important which highlights lack of teamwork. The respondent also resources as a hindrance, however emphasizing the importance of being creative and asking for sponsorship and donations until you get your desired resources as well as results. These findings show that although teachers have subjective experiences and perception towards the implementing EE in schools, resources limitation is a common challenge that cuts across geographical divides, for instance a study conducted in the Kwa Mashu Circuit of the Pinetown District in Kwa Zulu-Natal province, found that teachers are failed by resource limitation and the fact that the curriculum does not accommodate the effective teaching of EE (Fru and Ndaba, 2023). However, Ruthanam *et al.* (2021) highlighted that there is plethora of free online and print resources available, such as the Foundation for Environmental Education Academy which has launched an online learning platform offering several free courses for teachers as well as their learners (FEE- Eco Schools, 2023). Therefore, it depends on teachers whether they access and use these resources, as innovative teachers usually overcome certain limitations through awareness and initiative.

Time constraint and teacher-learner ratio was also mentioned by STE as a challenge, as reported saying, *“In this school we have ± 50 per class in Grade 10, overall, that ± 200 . So, if they a school allows ± 50 learners per class others may be disadvantaged.”* A study Ralph and Stubbs (2014) also noted lack of funds, time constraints, and large classroom size as impediments to the implementation of environmental education. Moreover, STE highlighted the fact that although the national policy mandates all South African school to integrate EE in all subjects at all levels of education, there is no policy guideline that suggest how EE should be integrated into other subjects (Damoah and Adu, 2019). STE was quoted saying, *“It’s there on paper, but there is no direct implication on how this is supposed to be taught. For example, when you go to Geography, as much as you do have human population, global warming, climate change topic, it mostly theory. There are no practical’s, learners are not able to say, if I throw this plastic bag it is going to move from here to the ocean and the population in the ocean is going to be affected. So, it’s something that is very far-fetched.”* These findings concur with Rampasso *et al.* (2019) study which analysed some of the main challenges that hinder the insertion of sustainability theme in engineering courses, using Technique of Order of Preference by Similarity to Idel Solution (TOPSIS). The results reveal that sustainability problems are discussed in specific fields of study in a limited context, difficulty to embed disciplines for the broad teaching of sustainability, and lack of practical and real examples of how sustainability can be implemented in a specific course context.

4.3.4.5 Teachers’ Recommended Strategies in the Implementation of Environmental Education in Schools

We asked respondents to list their recommendations for successfully implementing EE strategies as a conclusion to the interview. Most respondents listed answers they touched on earlier in the interview, such as departmental integrated policy guidelines on ‘how’ to implement environmental education; EE as an independent subject; provision of professional development and training to teachers and learners; collaboration between relevant stakeholders such as government (national, provincial and local); NGOs; private sector; educational institutions; and communities. It is important to note that these

strategies have also been presented and recommended in previous studies and/or reports. This means many countries deal with common challenges and environmental issues, and as a result, countries can learn from each other (UNESCAP, n.d.).

Only STE suggested incentives as a way to encourage effective implementation and practice of EE in schools. *“One aspect I can think of is competitions, where schools do events/projects related to environmental education, such as climate change, and there should be prizes to be won. This would be beneficial because whatever the learners win, it’s for the school. Therefore, I would give incentives because no one likes doing something for free even though it would benefit them.”* A school which initiated an EE programme used competitions as an approach was the Stamford American International School, which promoted learners’ environmental stewardship by organising a sustainability competition for Earth Day (SAIS, 2023). Learners created bioplastics using everyday ingredients, started a vertical garden, and participated in a scavenger hunt to identify different plants found on school grounds to engage learners as well as inspire innovation.

STA explained, saying, *“The Department of Basic Education (DoE), the Department of Forestry, Fisheries, and the Environment (DFFE), and the Department of Health (DoH) are the main departments that should be working together and then come up with one piece of legislation detailing what schools should be doing and how concerning environmental education.”* According to DFEE (2020), the Department of Health (DoH) is important in schools because it is responsible for regulations pertaining to food safety, which deals with the handling of food as a waste prevention measure, and regulations around health care risk waste, such as human faeces and absorbent hygiene products such as disposable tissues and feminine hygiene products. The result revealed the lack of provision of detailed policy guidelines that can be used to evaluate and monitor the teaching of EE in schools. Hence, the Department of Health (DoH) should be involved in the inception, strategy development and finalisation of a detailed policy document that teachers can use as a resource to implement curriculum-based environmental education. Similar findings were reported by Ramsaroop and Van Rooyen (2013), where teachers

revealed difficulties in following the cross-curricular approach to teaching environmental education, as the policy document failed to define how to integrate environmental themes into the curriculum, and instructional hours do not allow teachers to get creative.

However, one can argue that instead of waiting for the DoE, as curriculum developers, and the Department of Forestry, Fisheries, and the Environment (DFFE), as the custodian of environmental management, schools can initiate and develop an Environmental Education Management Policy (EEMP) that would address some of the issues and challenges that teachers face when it comes to implementing environmental education. Additionally, the DoE can mandate schools to formulate their own EE plan that provides an integrated system approach for the schools; for example, schools in New South Wales are required to develop their own plan that covers three important sections, namely curriculum, resource management and environmental management within schools' grounds (DET, 2001).

STB proposed that EE should be an independent subject and not integrated into other subjects. This can be attributed to the fact that South Africa has proved that the implementation of EE in the school curriculum lacks uniformity, resulting in a slow and marginalised development process of EE (Damoah, 2021; Damoah *et al.*, 2024). Another article argued that EE should be a standalone subject or course with environmental content only. A study conducted in India by Verma and Dhull (2017) introduced EE as a compulsory subject for all learners doing arts, science and commerce at the undergraduate level by the University of Grants Commission (UGC), at the school level by the National Council of Education Research and Training (NCERT) and State Education Councils (SEC).

STC addressed the role of civil society institutions such as households that should be considered as key players in developing positive behaviour around waste management, as reported, saying, *"I think parents are potential players for community-based action on waste because it all starts at home."* The above-mentioned recommended strategies from interviewed teachers are the same as the results from a study conducted by Andrade-Arenas and Espinoza (2024), where respondents suggested a plan of action to promote

sustainable practices in schools. These include hosting conferences and workshops with experts as a way of training teachers and empowering learners; one respondent highlighted that education provides a strong foundation for understanding EE like waste management, while other respondents highlighted the importance of community education in minimising waste in local areas and the use of community education to bridge the gap between theoretical knowledge and practical implementation. In conclusion, it is important to consider that the above-recommended strategies will materialise only if they are implemented in conjunction with other approaches.

4.3.5 Qualitative Observation Findings

This section presents observational checklist results of school ground waste management practices which were identified as a primary data collection source. Qualitative observation refers to collecting unstructured primary information in a systematic and meaningful way, using one's senses, like watching people and places at a research site (Creswell, 2016). This means observation in its different forms allows observers to compare interview theme findings to observation theme findings for the purpose of answering questions that were not answered in interviews (Parahoo, 2014). As a result, this data source was chosen, as it allowed the researcher to gather first-hand information and obtain information that supplements the spoken interview responses from participants. This was done through observing what was taking place in a real-life setting. The researcher conducted observational site visits at the six selected secondary schools under Pinetown District in the eThekweni Municipality to observe the waste management practices of the schools.

4.3.5.1 General Waste Management: Provision of Waste Bins in Schools

In South Africa, local municipalities are mandated by the constitution to deliver waste management services to all citizens (RSA, 1996), and one of the many ways municipalities provide this service is through waste bin provision and refuse waste collection services (GreenCape, 2020). For this reason, the researcher observed the provision of waste bins within the school grounds of the six selected secondary schools

under Pinetown District. Using a scale rating system, the researcher focused attention on the number and location of waste bins available in each school. The researcher noted that the selected secondary schools used standard general waste bins, cupboard boxes, plastic bags and open dumping as solid waste receptacles and as a way of managing waste.

In school SAO, there were no waste bins around the school grounds, but plastic barrels were placed in one area setting within the school premises and used as waste receptacles, and in the classroom, cupboards were used as waste receptacles. The number of waste receptacles counted between the scales of 6 and 10. A study by Fox (2022) supports placing waste bins in one area; the study states that waste bins should be placed or grouped in a designated area to create a bin station to instil best practices.



Figure 11: Blue barrels receptable used as waste bins at school SAO.



Figure 12: Cardboard receptable used as waste bins at school SAO.

During the walkabout, the researcher found that the school SAO has green waste bins available but were stored in a lockable classroom used as a storage. This was because waste bins get stolen when placed outside, whereas plastic barrels are not stolen, which defeats the purpose of using waste bins in the first place.

In school, SOB, black general waste bins were observed and placed around school grounds; however, no waste bins were observed in the classroom. The number of waste bins observed was (6-10) black general waste bins placed around the school grounds and corridors.



Figure 13: Unused green waste bins placed in storage room at school SAO.



Figure 14: General black waste bins observed at school SBO.

School SDO was also found using black general waste bins; however, these waste bins were empty and placed near the kitchen. The number of waste bins found in school SDO was between 0 and 5 and used for food scraps, where one was placed near the kitchen door and the other was observed behind the staffroom, which is closer to the soup kitchen.



Figure 15: Unused waste bins laying near the fence at school SDO.



Figure 16: Black waste bins placed near a kitchen used for food waste at school SDO

In school SCO different types of waste bins were observed and placed throughout the school grounds; some were placed near classroom doors while others were placed in the hallways of the school. These waste bins had bin liners, often used for convenience and helps with minimising the odour from bins and makes disposal process easy for refuse collectors. This school had the highest number of available waste bins with a counted number of (11-15) waste bins in comparison to other schools.



Figure 17: Black general waste bins used for waste disposal at school SCO.



Figure 18: Green waste bins used waste disposal at school SCO.

School SEO was also found to have black general waste bins, and like school SDO, school SEO also had the lowest number of waste bins, with only (0-5) waste bins observed around the school grounds. School SFO was the only school to have been found using black refuse bags to dispose of waste and were placed at the door of every classroom, while in the classroom cardboard were used as waste receptacles.



Figure 19: Black plastic bag used for waste disposal at school SFO.

The overall result for waste bin provision in schools revealed that the majority of the schools have waste bins around the school grounds. However, the type of waste bin used or available in each school was different, with most schools having a limited number of waste bins provided. According to CSIR (2011:12), the focus should be on the service being provided rather than on the type of receptacle in use, as long as the receptacles are suitable for the specific areas' challenges. Moreover, fewer bins give reduced options for waste and bin contamination, and bins should be placed in busy areas where people can monitor each other (Fox, 2022).

4.3.5.2 General Waste Management: Usage of Designated Waste Bins by Learners

As such, the researcher observed if learners use available waste bins or receptacles to dispose of their waste, resulting in a litter-free school. The results showed poor waste management practices under Pinetown district secondary schools; for example, litter was observed during site visits in classrooms, kitchen areas, and school grounds. Of the six schools observed, schools SAO, SBO, SDO, SEO and SFO were found to have failed to maintain clean school grounds and classrooms, except for school SCO, which was found to have a clean school environment.

This can be attributed to the school SCO having a sufficient number of waste bins within the school grounds. This means that learners of this school utilise waste bins as intended, and the school was able to identify major areas where waste is most generated and therefore developed and implemented a waste management plan specific to the needs of the school while teaching good waste management practices to their learners. For example, a study by Dalu *et al.* (2020) states that primary and secondary schools in South Africa instructed learners to use bins for litter, therefore decreasing the amount of waste items from being thrown away into the environment.



Figure 20: Clean grounds observed at school SCO.

These findings indicate that learners from the schools SAO, SBO, SDO, SEO, and SFO tend to overlook the environmental impact of littering, failing to recognise it as an unlawful practice, which suggests a nonchalant attitude towards this behaviour. Furthermore, the findings reveal that a lack of waste receptacles is a significant contributor to littering. Schenck *et al.* (2022) and Hansmann and Steimer (2017) noted that individuals rarely identify themselves as litterers and often attribute their littering to external factors, such as insufficient waste bin provision. In contrast, being littered by others is commonly linked to problematic behaviours and personal traits, including laziness, ignorance, naivety, convenience, and inattentiveness. This conclusion suggests that merely understanding what constitutes negative behaviour, such as littering, is inadequate for preventing it; individuals must also grasp the negative consequences of engaging in such behaviour to deter it (Ally-Charles *et al.*, 2024).

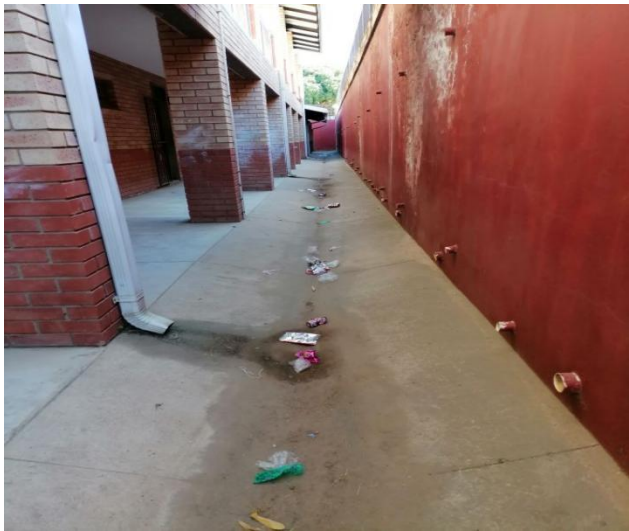


Figure 21: Dirty school grounds at school SDO.



Figure 22: Dirty school grounds at school SBO.

4.3.5.3 General Waste Management: What Disposal Method is used in Schools

The manner in which learners dispose of waste in schools is one of the crucial components in the waste management practices; therefore, an evaluation was conducted

to reveal the most prominent waste disposal method used in the selected secondary schools. The results indicate that learners disposed of their waste through various methods; some common methods included open dumping, burning, recycling, and landfilling. However, open dumping and open burning were the most prevalent disposal methods; the dumping sites are often set on fire to reduce the amount of waste that accumulates (Akmal and Jamil, 2021). It was noted that the majority of the selected secondary schools used more than one disposal method; for instance, schools SAO and SOE practice open dumping and landfilling, while school SB practises open dumping and recycling, and schools SDO and SFO were found to practice open dumping and open burning. Out of the six schools, school SCO was the only school to have had clean and neat school grounds and at the same time practise open dumping, recycling and landfilling.

These practices are associated with major public health issues and environmental pollution, resulting in the emission of dangerous toxic substances such as dioxin (Siddiqua *et al.*, 2022). These results show that indiscriminate dumping is a common practice amongst secondary schools in the Pinetown District, and these practices often contribute to blocked drainage systems resulting in flooding and waterlogging (Pervin *et al.*, 2020) and waterborne diseases such as cholera and typhoid (Zhao *et al.*, 2015). By comparison, these results correspond with the learner's response pertaining to the most common method used for disposing of waste in secondary schools under Pinetown District. The reason is that open dumping and burning remain alternatives for waste disposal for citizens that have limited and/or no access to regular waste removal services.



Figure 23: Open dumping practice at school SDO.

All schools were found to have hired waste cleaners who are responsible for collecting littered waste in classrooms and school grounds, ensuring that school grounds are clean and visually appealing. This could be the reason for learners' littering behaviour. Moreover, learners confirmed that there are no environmental and/or waste programmes like litter pick-up day or classroom duty roster to control and combat the littering behaviour and sanitation problems amongst learners. Abubakar *et al.* (2022) opined that the unsustainable approach of practising illegal dumping or burning of waste in an open space was an acceptable disposal method. Similarly, most communities, including schools, still practice old disposal methods that were acceptable; in this case, these are uncontrolled dumping and open burning.

3.3.5.4 Recyclable Material: Provision of Recycling Bins on School Grounds

Waste diversion programmes play an important role in waste reduction efforts (Raza, 2024); therefore, waste diversion practices were observed in the selected secondary schools. The researcher aimed to identify whether the school had recycling bins within school grounds, labelling of recycling bins, and demarcated recycling areas, and if the schools practised waste diversion strategies. In all selected secondary schools, no

recycling bins or labelled receptacles were identified; the only waste bins and receptacles were identified. School SBO and SCO were the only schools that practised recycling, while schools SAO, SDO, SEO and SFO showed no signs of recycling. Based on the above results, one can conclude that lack of provision and adequate recycling bins (in quality or quantity) is one of the leading causes for poor recycling efforts in educational institutions. Because for a recycling programme to be effective, adequate strategies are prerequisites (Huun, 2022). For example, providing a clear labelling or colour-coding system, instructions on what items can be recycled, and strategically placed bins for different types of waste serves as a reminder for learners and the school community to practise effective waste segregation (Raza, 2024); unfortunately, often the government and schools fail to provide sufficient and satisfactory recycling facilities, which hinders waste diversion efforts.



Figure 24: Recycling effort at school SBO **Figure 25:** Recycling effort at school SCO.

Alternatively, school SAO and SCO were found to have gardens; however, these gardens are not maintained by the learners. It was discovered that volunteering community members are the people responsible for managing and nurturing these gardens.

The result is a missed opportunity for the schools to implement waste diversion through composting and gardening. Because gardening in schools emphasises the role of EE as an instrument for connecting learners with nature (Aikaterini *et al.*, 2020). Additionally, vegetable gardens support parents and guardians to provide a variety of nutritious food to their children through the school feeding scheme and strengthen the relationship between the school and the community (FAO, 2014). These activities can prevent absenteeism and poverty-related hunger and illnesses.



Figure 26: Vegetable Garden at school SAO.



Figure 27: Vegetable Garden at school SCO.

4.4. CHAPTER SUMMARY

This chapter presented and discussed research findings gathered from quantitative and qualitative analyses. Quantitative results are interpreted through percentages, charts, graphs and tables, while qualitative insights are derived from patterns in words, phrases, and sentences. Together, these approaches provide conclusions aligned with the study's research questions.

CHAPTER FIVE: SUMMARY OF RESULTS, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter provides a summary of the research results and offers a conclusion to determine whether waste awareness programs have been implemented in the curriculum in Pinetown District secondary schools. This chapter further provides recommendations for future research studies to promote and support the implementation of waste awareness programmes around Pinetown District secondary schools.

5.2 SUMMARY OF RESULTS AND CONCLUSION

This section gives an abstract summary of the research findings and offers conclusions in relation to the research objectives of this study, which are as follows:

5.2.1 To determine whether waste management and awareness are part of the school curriculum around Pinetown District

The research study found that the level of awareness and knowledge on environmental concepts such as waste, waste management, and EE was very low, as perceived by both teachers and learners. However, the level of knowledge and awareness was higher amongst Grade 12 learners compared to Grade 9 learners, highlighting differences in curriculum teaching between the grades. Findings revealed that learners understand the implications associated with poor management and the significant role that education plays in shaping good waste management practices. Teachers also unanimously agreed on the role schools play in waste management education. Learners believe lifestyle change contributes to waste reduction; other practical behaviours include using designated recycling waste bins, partnering with a recycling company and educating teachers, staff and learners. Hosting awareness and campaigns, avoiding single-use and disposable items, setting up a compost project and going paperless were mentioned by a small number of learners.

The study found schools as the main source for imparting and promoting waste awareness information to learners, thus increasing environmental knowledge and awareness amongst learners and encouraging the adaptation of pro-environmental behaviour (Mohiuddin *et al.*, 2018). The pattern followed with home, municipality, books, environmental organisation and others. School subjects such as Life Orientation, Geography, and Natural Science were identified by both teachers and learners as having integrated environmental-impact topics in the curriculum, while Social Sciences and Life Sciences were mentioned by only teachers. As a follow-up question, teachers revealed that waste management as a topic is not integrated into the curriculum, and the majority believe that EE deserves to be an independent subject but believe that for EE to be effectively implemented, collaboration is required amongst teachers, various government agencies, such as DoE, DFFE, and SANBI; conservation bodies like WESSA, WWF, and Ezemvelo Wildlife; local authorities like eThekweni Municipality and communities.

Teachers also confirmed the non-existence of policy documents pertaining to EE implementation strategies, while others highlighted a common unwritten rule or code of conduct that forbade learners from littering. Therefore, new strategies for infusing environmental literacy must be explored and developed in other school subjects, whilst the roles of Life Orientation, Geography, and Natural Science need improvement (Ndzimbomvu *et al.*, 2021). Overall, the mandate set by the National Waste Management Strategy and the CAPS policies to integrate EE were marginally implemented in secondary schools under the Pinetown District, KwaZulu-Natal Province, South Africa. However, the regulatory framework for implementing waste management curricula lags behind the policy intent. Therefore, more effort is required in integrating EE and waste awareness topics into the curriculum through better information, education, monitoring, and training (UNEP, 1992).

5.2.2 To determine if waste management awareness campaigns/projects have been hosted before in schools

The research study found that local authorities and schools under Pinetown District lack effort in initiating and promoting waste awareness campaigns or projects, as the majority

of learners revealed that they have not participated in the celebration of environmental days such as World Environmental Day, and learners have never attended or been involved in a cleaning campaign. The finding highlights the importance of linking theory and practice to bridge the gap between what is learnt and what is practised. This is disappointing because learners are receptive, keen, and unbiased in learning and participating in environmental-related issues, as findings showed the majority of learners have a positive attitude towards attending and/or participating in waste-themed campaigns or programmes. Teachers also showed interest in attending environmental awareness or waste management training organised by major stakeholders, such as their schools or local authorities, or environmental organisations. For instance, two teachers attended an EE training hosted by the University of KwaZulu-Natal (UKZN) in their own capacity, while two teachers revealed that EE training was only attended by their school principals and not them, highlighting an opportunity for schools to host their own teacher training to improve environmental knowledge and encourage waste awareness campaigns or projects.

Of the five schoolteachers that were interviewed, four confirmed to have participated in a waste awareness campaign or project, either initiated by the school, an environmental organisation and/or the local municipality. SCO and SEO are the only schools that hosted a waste awareness campaign, where SCO initiated a paper recycling campaign since COVID and SEO hosted a recycling creative arts event. SAO hosted a waste awareness campaign in partnership with Enviroserve, while SBO partnered with Columba Leadership Academy, and SCO worked with a recycling company based in Phoenix.

The study also found that the eThekweni local authority, in collaboration with the Department of Parks and Recreation, has only conducted a waste awareness and sustainability campaign at schools SAO and SEO, respectively. Other teachers highlighted that when the local authorities organise campaigns, the focus is often on violence and drug abuse. Based on the findings, it can be concluded that the schools and local authorities, together with environmental organisations, have hosted waste awareness campaigns; however, the level of implementation remains relatively low, as it

is often difficult to convince the older generation to engage in environmental initiatives because they regard environmental issues as less important and are set in their old ways of thinking and behaving.

5.2.3 To evaluate the level of waste management awareness in schools

The research study found that learners in Pinetown District understand the term 'littering'; however, the majority have poor practices towards picking up litter around the schools and roadsides, and the majority have never participated in a litter-pick-up day organised by their schools. This was evidence, as litter was observed during the site visit conducted by the researcher in areas such as classrooms, kitchen areas and school grounds. These findings prove that learners do not view littering as an unlawful practice, therefore displaying nonchalant behaviour towards littering. Regarding learners' knowledge about waste hierarchy-related terms, the study showed that most learners understand the concepts of reuse and recycling, but the majority of learners do not understand the phrase 'waste reduction'. Furthermore, the study shows that Grade 9 learners can define the term 'rethink' compared to Grade 12 learners, highlighting a gap in knowledge between the two grades. This means the concept of rethink is slowly gaining popularity as an emerging phrase of the waste hierarchy; however, more effort is required in teaching the vocabulary and factual meaning of waste hierarchy concepts and their related terms. Furthermore, the majority of learners understand the importance of recycling as a waste reduction mitigation measure, and the majority claim to reuse and recycle their waste materials at school and at home; however, only half collect recyclables at school and at home, and less than half of the learners know a local recycling company in their areas.

The results suggest that learners have knowledge and positive attitudes towards good waste management practices, such as the benefits of litter pick-up and reuse and recycling; however, they demonstrate poor waste management practices and behaviour; therefore, most learners shy away from participating in recycling efforts and collaborating with recycling companies. In conclusion, learners under Pinetown District have a high level of waste awareness knowledge but demonstrate a low level of practice and positive

behaviour, which signifies a paradigm shift in practices and injunctive norms to positively influence recycling behaviour.

5.2.4 To evaluate the waste management facilities in schools around Pinetown District

The research study found that the selected secondary schools generate papers, bottles, cans, food and others. Paper was revealed as the most generated type of waste, which indicates the prevalent use of paper in schools. Other easily recyclable and/or compostable waste found were cans, bottles, and food scraps. The selected secondary schools had different provisions of waste management facilities; these included standard general waste bins, waste receptacles, cupboard boxes, and plastic bags. However, no designated or labelled recycling was found during site observation. Additionally, most learners agreed that there is a lack of provision and availability of waste recycling bins in their schools; therefore, learners use receptacles for recycling.

The results indicate that learners disposed of their waste through various methods; some common methods included open dumping, burning, recycling, and landfilling. Open dumping and open burning were prevailing disposal practices observed by the researcher and identified by learners across the selected schools and, by extension, Pinetown District. It was noted that the selected schools use more than one disposal method. These findings prove that recycling and composting are practised by a small number of learners, as observation found only two schools that practise recycling. This is not surprising because schools have hired waste handlers who are responsible for picking up litter around school grounds, emptying bins and placing waste in collection points. Learners also identified the local authority as responsible for waste management, which mandates the local government with the responsibility for waste collection, refuse dumps, solid waste disposal and cleaning (National Treasury, 2011). Overall, waste management facilities exist in the selected secondary schools; however, the type of waste bin and/or receptacles used in each school were different, with most schools having a limited number of waste bins available.

5.2.5 To identify challenges of implementing waste awareness programmes in Pinetown District

The study found that the majority of the interviewed teachers believe the government has not applied the required effort in implementing waste awareness programmes in schools, highlighting the limited knowledge and awareness, poor attitude and practice in schools, as well as the lack of legal penalty should teachers fail to implement environmental education. The findings suggest a lack of sufficient support from the government, especially the Department of Education. However, teachers also believe that the government's failure is due to various challenges that exist and transcend beyond geographical divides. These include a shortage of teacher training and workshops, time constraints, poor attitudes and lack of collaborations between the government, school management teams, teachers, learners and community members, resources, and various responsibilities that need government attention, such as gender-based violence, drugs and teenage pregnancy. In conclusion, teachers suggested different strategies that they believe will yield the desired results for successfully implementing EE and waste awareness programmes in schools. Teachers believe EE should be an independent subject, and departmental integrated policy guidelines on 'how' to teach EE should be developed. Furthermore, provision of professional development and training should be made a requirement for teachers and learners. Improve collaboration between relevant stakeholders such as government (national, provincial and local), educational institutions, non-government organisations, the private sector, and communities. The government needs to introduce incentives as a way of promoting EE and waste awareness programmes.

5.3 RECOMMENDATIONS

This section offers recommendations in relation to the research findings; the following recommendations are advised:

5.3.1 Environmental education should be taught as an independent school subject in all levels of formal education.

This study advises that the Department of Education should implement EE as an independent subject in all levels of formal education. This would ensure that EE and waste awareness topics are well covered in the curriculum, resulting in a high level of knowledge, skills, and values amongst learners. Because little has been achieved in successfully implementing EE and waste management topics into the curriculum, as content coverage remains marginalised and presented in a fragmented manner.

5.3.2 Development of policy guidelines on how to teach environmental education in schools

This study advises that the Department of Education should formulate and implement a policy document that explains what EE is and the aim of teaching it. The document should also illustrate how EE and its related concepts should be taught; it should indicate time allocation and formal and informal assessments, such as theoretical and practical activities, projects, tests and examinations, and include the recording and reporting of learners' level of performance and readiness to progress to the next grade. Finally, the document should show how the Department of Education will assess and oversee teachers to ensure they teach EE.

5.3.3 Development of Environmental Management Policy in Schools

This study advises secondary schools under the Pinetown District and, by extension, South African surroundings to develop an Environmental Education Management Policy (EEMP) that promotes projects and campaigns, knowledge and skills, positive attitudes, enforcement of codes of conduct, and good practices towards the environment. For example, mobilise learners to create posters that forbid everyone from littering and posters that promote environmental days like World Environmental Day and Harbour Week. Moreover, schools should formulate an EE plan that focuses on resource management, project development and environmental management. For instance,

teachers should involve learners in creating a litter picker-up roster and initiate a recycling or vegetable garden project for them to connect with nature, practice composting, and get nutritious food as a reward.

5.3.4 Mandate all schools to participate in environmental and waste awareness programmes

This study advises that the DoE and Department of Forestry, Fisheries, and the Environment (DFFE), in collaboration with the various government agencies and environmental organisations, should mandate all schools to participate in environmental and waste awareness programmes. Schools can participate in waste management education programmes initiated by the eThekweni Municipality; the school beautification programme initiated by the eThekweni Municipality in partnership with the provincial Department of Agriculture and Environmental Affairs (DAEA) and the eThekweni Municipality's Department of Health (DoH) and WESSA; the eco-schools programme initiated by WESSA; and the EE camps and day programmes initiated by Ezemvelo KZN Wildlife and the Columba Leadership Academy. Additionally, these agencies, local authorities and conservation bodies can support schools' EE through reading materials like posters, pamphlets and learner excursions. For example, an event (environmental day celebration, Arbour Week, waste hierarchy – reduce, reuse, recycle and rethink) can be organised and hosted in a nearby stadium by different stakeholders where schools under Hammarsdale-uMhlathuzana, Mafukuzela-Ghandi and Durban Northwest management centres in the Pinetown District can attend. This will eliminate any financial constraints from parents.

5.3.5 Provision of professional development and teacher training

The study advises that the DOE, as responsible for developing, implementing, and monitoring EE, should make EE courses an independent module that is compulsory in higher education institutions in all major study fields. The course can train teachers on how to effectively integrate EE in their instructional hours, share resource material and creative ways of teaching EE models, and enhance teachers' understanding and

knowledge of environmental issues. Furthermore, the DoE can appoint EE representatives to organise a fresher course for teachers every six months, and a certificate should be awarded.

5.3.6 Appointment of Environmental Education Facilitator

This study advises that the DFFE should appoint an EE representative, for example, a scientific researcher with an environmental background. These representatives can outsource resource material (magazines, posters and pamphlets) from environmental organisations and develop curriculum content to introduce EE as an independent subject to all schools. These facilitators will be responsible for visiting schools (at least twice a month) to raise awareness on key environmental and waste management issues and responsible for initiating, overseeing and monitoring various EE models such as place-based learning, project-based learning, problem-based learning, active learning, and sustainable development education programmes. Responsible for organising professional development and training for teachers every six months. Facilitators can invite celebrities and influencers such as actor John Kani, artist Proverb, influencer Maps Maponyane, Fezile Mkhize, media personalities Zoe Brown and Clare Mawisa (WWF, 2020). Other environmental activists from the 50/50 TV show, like Kia Johnson, Poppy Ntshongwana, Yola Magogwana, and Romario Valentine. This would encourage learners to participate in environmentally related initiatives and tune in to 50/50, Focus and Geographic Wild shows that teach environmentally related content.

5.3.7 Continuous and Further Evaluation Research

This study advises further research and continuous research to be conducted to evaluate the extent to which environmental education, especially waste awareness topics, have been integrated into the curriculum. This will assist in bridging the gap between what is taught in the classroom and what learners engage in in their school activities.

5.4 CHAPTER SUMMARY

This chapter presented the conclusions derived from the study's findings. It provided a concise summary of key results and outlined the final recommendations. These chapters offered closure to the investigation and noted practical steps for effective implementation of environmental education and waste awareness initiatives.

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APPENDICES

Appendix 1: Learner Questionnaire

SCHEDULED LEARNER QUESTIONNAIRE

Please be advised that all information in this questionnaire will be used strictly for the purpose of this study, therefore all information will be treated as confidential. Also please be advised that this is NOT A TEST, therefore there is no right or wrong answer.

SECTION A: DEMOGRAPHICS

1. School Locality	Urban ☐	Rural ☐			
2. Gender	Female ☐	Male ☐			
3. Age	13-15 ☐	16-18 ☐	Other:		
4. Race	African ☐	Coloured ☐	White ☐	Indian ☐	Other ☐

SECTION B: AWARENESS AND KNOWLEDGE QUESTIONS

To determine whether waste management and awareness is part of the school curriculum around Pinetown District

5. Do you have any idea what waste is?	Yes ☐	No ☐
6. Do you know what the concept waste management means?	Yes ☐	No ☐
7. Do you understand what environmental education is?	Yes ☐	No ☐
8. Are you aware of any negative impact of improper waste management in the environment?	Yes ☐	No ☐
9. Do you think education/schools can play an important role in waste minimisation?	Yes ☐	No ☐
10. Do you believe that waste management problems will only be eliminated when people change their lifestyle?	Yes ☐	No ☐
11. Do you have specific subjects that deal with environmental education and awareness, including waste in general?	Yes ☐	No ☐
11.1 If yes, please choose those subjects: Geography ☐ Life Science ☐ Life Orientation ☐ Tourism ☐ Natural Science ☐		

Arts & Culture ☐		
Other ☐		
12. Which of the following ways are effective in dealing with waste?		
Avoid single use & Disposable items ☐		
Using designated recycling bins ☐		
Set-up a compost project ☐		
Educate staff & students ☐		
Going paperless ☐		
Hosting awareness & campaigns ☐		
Partner with a local waste recycling company ☐		
13. Where do you learn most about waste management/ environmental education?		
School ☐		
Home ☐		
Municipality ☐		
Environmental Organisation ☐		
Books ☐		
Other ☐		
14. Does your school celebrate Environmental days such as the World Environmental day, Global Recycling Day etc.?	Yes ☐	No ☐
To determine if waste management awareness campaigns/events/projects have been hosted before in schools		

15. Have you ever attended any environmental awareness/waste management program hosted by local authority/ school?	Yes ☐	No ☐
16. Have you ever been involved in a cleaning campaign/project?	Yes ☐	No ☐
17. Would you attend an environmental awareness/waste management program if it was hosted in your school or area?	Yes ☐	No ☐
18. Would you be interested in being involved in an environmental campaign/project?	Yes ☐	No ☐

SECTION C: ATTITUDE AND PRACTICE QUESTIONS

To evaluate the level of waste management awareness in schools		
19. Do you have any idea what littering is?	Yes ☐	No ☐
20. Do you pick up litter on the school ground or on roadside?	Yes ☐	No ☐
21. Can you explain what Reuse means in waste management?	Yes ☐	No ☐
22. Are you familiar with the term Recycling?	Yes ☐	No ☐
23. Have you heard of waste Reduction in waste management?	Yes ☐	No ☐

24. Can you define the word Rethink in waste management?	Yes ☐	No ☐
25. Do you re-use recyclables at school or at home?	Yes ☐	No ☐
26. Do you collect recyclables at school or at home?	Yes ☐	No ☐
27. Do you have knowledge of any recycling company in your area?	Yes ☐	No ☐
28. In your view, do you think recycling is important in mitigating waste in your area?	Yes ☐	No ☐
29. Does your school have a litter-pick-up day?	Yes ☐	No ☐
To evaluate the waste management facilities in schools around Pinetown District		
30. Do you have waste recycling bins in your school?	Yes ☐	No ☐
31. What type of waste is generated in your school? Paper ☐ Bottles ☐ Cans ☐ Food ☐ Other ☐		
32. What disposal method does your school use? Open dumping ☐ Burning ☐ Recycling ☐		

Composting ☐
Landfilling ☐
33. Who is responsible for waste collection in your school?
Learner ☐
Hired waste cleaner ☐
Municipality ☐

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE!!!!

Appendix 2: Teacher Interview Questions

SCHEDULED INTERVIEW TEACHERS (Semi-structured)

1. What subject/s are you responsible for and what grade do you teach?
2. What do you understand about the term Environmental Education? Please explain.
3. Do you have specific subjects that deal with environmental education and awareness?
4. Specifically, does your curriculum cover waste management as a topic? If yes, how does your school teach it?
5. Do you think that Environmental Education deserves to be a subject on its own? Please support your answer.
6. Who do you think is responsible for teaching environmental education in schools?
7. Are there any environmental policies in your school? If yes, what does it state about Environmental Education?
8. Has the school hosted waste management awareness campaigns/events/projects in your school before? If yes, please name them and if not, why?
9. Are there any waste management awareness campaign/events/projects the school participates in? If yes, please name them and if not, why?
10. Has the local municipality hosted any waste management awareness campaigns/events/projects in your school before? If yes, please name them.

11. Do you think education/schools can play an important role in waste minimisation?
12. Have you and/or teacher(s) from your school ever attended any environmental education and awareness training organised by school or local authorities? If yes, please list them.
13. Would you attend an environmental awareness/waste management training or workshop if it was organised by local authorities or your school?
14. What are the main challenges of implementing waste awareness programmes in schools? Please identify and explain these challenges?
15. According to you, have the government and schools applied the required effort in implementing waste awareness programmes in schools? Please explain
16. What can be done to effectively implement and practice Environmental Education inschools?

Appendix 3: Observational Checklist

ENVIRONMENTAL OBSERVATIONAL CHECKLIST FORM

NAME OF SCHOOL: _____

DATE: _____

COMPLIANCE AND NON-COMPLIANCE POINTS ANALYSIS					
0	1	2	3	4	5
None existence	Unsatisfactory	Needs Improvement	Acceptable	Good	Excellent
Areas audited	Yes/No	Score (0 - 5)	Comments		
GENERAL WASTE MANAGEMENT					

1. Are there any waste bins provided on school grounds?			
2. Do learners use designated waste bins?			
3. Is the school site litter free?			
4. How many waste bins available in the school? 0 – 5 ☐ 6 - 10 ☐ 11 – 15 ☐ 16 - 20 ☐ 21> ☐			
5. What type of waste is generated in the school? Paper ☐			

Bottles ☐ Cans ☐ Food ☐ Other ☐	
6. What method is used to dispose waste? Open dumping ☐ Burning ☐ Recycling ☐ Composting ☐ Landfilling ☐	
RECYCLABLE MATERIALS	

1. Is there provision of recycling bins on the school grounds (cans and papers)			
2. Are recycling bins labelled?			
3. Are there any signs of recycling within the school premises, e.g. composting?			
4. Are waste handlers wearing PPE (personal protective equipment)?			
5. Does the school have a demarcated recycling area?			

Appendix 4: Ethical Clearance Approval Letter from University of South Africa



UNISA-CAES HEALTH RESEARCH ETHICS COMMITTEE

Date: 10/03/2023

Dear Ms Buthelezi

NHREC Registration # : REC-170616-051
REC Reference # : 2023/CAES_HREC/036
Name : Ms SS Buthelezi
Student # : 51154196

Decision: Referred back
Submission deadline for next
meeting: 30/03/2023

Researcher(s): Ms SS Buthelezi
51154196@mylife.unisa.ac.za;

Supervisor (s): Dr E Tshibalo
tshiba@unisa.ac.za; 083-555-7606

Ms S Tshimbana
tshimtp@unisa.ac.za; 071-419-3211

Working title of research:

Evaluating the implementation of waste awareness programmes in Pinetown district schools, eThekweni municipality, South Africa

Qualification: MSc Environmental Management

Thank you for the application for research ethics clearance by the UNISA-CAES Health Research Ethics Committee for the above mentioned research.

The **high risk application** was reviewed in compliance with the UNISA Policy on Research Ethics and the UNISA Standard Operating Procedure on Research Ethics Risk Assessment on 09 March 2023. **The application is referred back for revisions and clarifications.** Please provide the committee with a **cover letter** explaining how you have addressed the below mentioned aspects **by 30 March 2023**. Additionally, all application documentation should be amended to indicate the recommended changes. **Highlight all changes** made on the application documents to streamline the review process. The ethics clearance number, **2023/CAES_HREC/036**, must be used in all correspondence.



University of South Africa
Pretorius Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 7111 Fax: +27 12 429 7150
www.unisa.ac.za

Appendix 5: Approval Letter from the Department of Education



KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

OFFICE OF THE HEAD OF DEPARTMENT

Private Bag X9137, PIETERMARITZBURG, 3200
Anton Lembede Building, 247 Burger Street, Pietermaritzburg, 3201
Tel: 033 392 1051

Email: Phindile.duma@kzndoe.gov.za

Enquiries: Mrs B.T. Ntuli

Ref.:2/4/8/7401

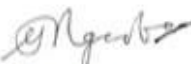
Mrs Snenhlanhla Sandra Buthelezi
P.O. Box 83
GOERGEDALE
3710

Dear Mrs Buthelezi

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: **"EVALUATING THE IMPLEMENTATION OF WASTE AWARENESS PROGRAMMES IN PINETOWN DISTRICT SCHOOLS, ETHEKWINI MUNICIPALITY, SOUTH AFRICA."**, 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 **22 February 2023 to 31st March 2025**.
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 Mrs Buyi Ntuli at the contact numbers above.
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 Office of the HOD, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to schools and institutions in KwaZulu-Natal Department of Education.


Mr GN Ngcobo
Head of Department: Education
Date: 22nd February 2023

GROWING KWAZULU-NATAL TOGETHER

Appendix 6: Consent Form for Parent/ Gurdian, Teachers, and Learners

PARTICIPANT INFORMATION SHEET

Ethics clearance reference number: **2023/CAES_HREC/036**

Research permission reference number: **2/4/8/7401**

21 March 2023

Title: Evaluating the implementation of waste awareness programmes in Pinetown District Schools, eThekweni Municipality, South Africa.

Dear Parent and/or Guardian

My name is **Snenhlanhla Sandra Buthelezi**, and I am doing research with **Dr. Tshibalo and Ms. Tshimbana** lecture (s), in the **Department of Agriculture and Environmental Science** towards **MSc in Environmental Management** at the **University of South Africa**. We are inviting you to grant permission for your child(ren) to participate in a study entitled **“Evaluating the implementation of waste awareness programmes in Pinetown District Schools, eThekweni Municipality, South Africa”**.

WHAT IS THE PURPOSE OF THE STUDY?

I am conducting this research to evaluate the implementation of waste awareness programmes in public and private secondary schools in Pinetown District. This study is expected to collect important baseline information that could inform suitable strategies to assist with the implementation of waste awareness programmes into the school curriculum in Pinetown District.

WHY AM I BEING INVITED TO PARTICIPATE?

Your child(ren) are being invited to participate in this study, as it concerns the implementation of waste awareness programme into the school curriculum, therefore they are well positioned to participate because they are a learner(s) within Pinetown District secondary schools. Permission to conduct the study was obtained from the Pinetown District Department of Education and the school governing bodies. The number of participants needed in this school is (n=100) which was calculated using a sample size calculation.

WHAT IS THE NATURE OF MY CHILD (REN) PARTICIPATION IN THIS STUDY?

The study involves answering a questionnaire; the questionnaire consists of three measures, namely, demographic questions (e.g., age, gender etc.); awareness and knowledge questions; and behaviour; and practice questions. The questionnaire will be answered within the school premises in a classroom and will be completed upon distribution. To maintain law and order the researcher will be accompanied by a teacher by the researcher's request. This will be done for the purpose of creating a comfortable environment for the learners as they are familiar with their teachers and trust them. The questionnaire will be conducted during break time, to avoid disturbing school activities. Lastly the questionnaire will take 30 minutes to complete.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent for your child (ren) to participate and there is no penalty or loss of benefit for non-participation. If you do decide to give permission, you will be given this information sheet to keep and be asked to sign a written consent form. Kindly be advised that once you have signed a consent form your child(ren) will still be required to sign an asset information sheet. Please be informed that anonymity and confidentiality is guaranteed as your child(ren) will not be asked information that can be linked to the data and your residential area, and no one will be able to connect you and/or them to the answers they provide.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

This research is expected to raise awareness about waste as an environmental problem, the negative impacts thereof, the importance of including waste as a topic in the school curriculum; and possible solutions to deal with waste in an environmentally friendly manner to archive sustainability. It is envisaged that the results of this study will provide baseline information and suitable strategies to assist with the implementation of waste awareness programmes into the school curriculum in Pinetown District.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

The participants may feel a minimal sense of deprivation if they have never been taught about waste awareness programmes in their schools and if awareness campaigns/ project have not been hosted in order to encourage environmental stewardship. Participants will be allowed a break should they feel discomfort; the breaks will allow participants to become less distressed and help recollect their thoughts; therefore, this method is deemed effective for dealing with unpleasant sensations. There are no perceived physical risks and harm linked with participation in this study. Measures taken to avoid any risk that may come from others identifying the person's participation in the research is anonymity of the respondents is guaranteed.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

Anonymity of the participant is guaranteed; therefore, you are hereby informed that all information collected during the study period will be kept strictly confidential. Permission to conduct the study at your school has been requested from the school governing bodies, and if you grant permission for your child(ren) to partake in this study, their participation will be anonymous. No publications or reports from this study will include identifying information on any participant.

With that said, kindly note that the data from the questionnaire will be used for the purpose of the research report that may be submitted for publication, but individual participants will not be identifiable in the said report. Moreover, the answers from the questionnaire may be reviewed by people responsible for ensuring that the research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

All documents used in this study will be stored in a safe environment. This means that hard copies of answers will be kept in a locked cupboard at the resident of the researcher for future research or academic purposes; for analyses purposes electronic information

will be stored in a computer with a password; and for safety measures they will be treated as confidential by the researcher. In the case where the information needs to be destroyed, hard copies will be shredded, and electronic copies will be permanently deleted from the hard drive of the computer using a relevant software programme.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

No costs or payment will be made to you and/or your child(ren) for participating in this study, participation is voluntary.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

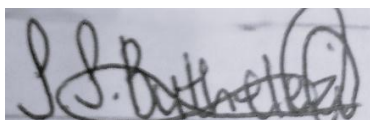
This study has received written approval from the Health Research Ethics Committee of the College of Agriculture and Environmental Sciences, Unisa. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Snenhlanhla Sandra Buthelezi on 071 169 7647 or email snebuthelezi93@gmail.com. The findings are accessible for 6 months. Should you require any further information or want to contact the researcher about any aspect of this study, please contact 071 169 7647, and email snebuthelezi93@gmail.com

Should you have concerns about the way in which the research has been conducted, you may contact Dr. Tshibalo, email tshibae@gmail.com; and/or Ms. Tshimbana, email tshimtp@unisa.ac.za. Contact the research ethics chairperson of the CAES Health Research Ethics Committee, Prof MA Antwi on 011-670-9391 or antwima@unisa.ac.za if you have any ethical concerns.

Thank you for taking time to read this information sheet and for participating in this study.



Signature

CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and prepared to participate in the study.

I understand that participation is voluntary and I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but participation will be kept confidential unless otherwise specified.

I agree to the recording of the questionnaire/ interview. I have received a signed copy of the informed consent agreement.

Participant Name & Surname..... (please print)

Participant

Signature..... **Date**.....

Researcher's Name & Surname..... (please print)

Researcher's signature..... **Date**.....



Appendix 7: Editing Letter



9 Akasia Street
Vierfontein Ontwikkelingsgroep
2615
081 354 1596
edit@profeditmba.co.za
20 February 2026

To Whom It May Concern

This serves to confirm that the dissertation: **EVALUATING THE IMPLEMENTATION OF WASTE AWARENESS PROGRAMMES IN PINETOWN DISTRICT SCHOOLS, ETHEKWINI MUNICIPALITY, SOUTH AFRICA** by *Snenhlanhla Sandra Buthelezi* was edited. The language, presentation, referencing system (both in-text and against the Reference List), were checked and corrected.



M Grundling
20 February 2026