

**SOLID WASTE MANAGEMENT THROUGH ENVIRONMENTAL EDUCATION
INITIATIVES: A CASE OF AMATHOLE EAST DISTRICT**

By

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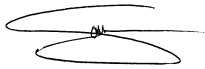
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DECLARATION

I, the undersigned, Isiah Nyati, Student number 51027879, hereby declare that this dissertation is my own original work, and it has not been submitted, and will not be presented at any other University or institution for a similar or any other degree award. I declare that I am fully aware of the University of South Africa's policy on plagiarism and I have taken every precaution to comply with the regulations. I also hereby declare that I am fully aware of the University of South Africa's policy on research ethics and I have taken every precaution to comply with the regulations.



14/11/2023

Signature:

Date:

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This dissertation would not have been possible without the input, guidance, support and prayers of several people, and for the roles everyone played in assisting and uplifting me, I am forever grateful.

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DEDICATION

I dedicate this dissertation to the following people:

To God, my Alpha and Omega. To my late father Mr John Tafundikira Nyati, may his soul rest in eternal peace. It was his wish to see his son making headway academically. Lastly, I dedicate this dissertation to my wife and children, my mother and mother-in-law; they are my pillars of strength and greatest inspiration.

ABSTRACT

Disposing of solid waste is one of the most serious and controversial issues facing countries around the world. The problem is caused by daily human activities. The main aim of this qualitative study was to explore solid waste management in primary schools in the Amathole East District of South Africa. The research objectives were to investigate what solid waste management strategies were in place in the sampled primary schools, and to recommend best practices in this regard. Failure to act timeously will lead to a deterioration of environmental conditions, which could have negative consequences for human health. The researcher adopted the Waste Management Theory, as it aligned with the stated research objectives. An interpretive paradigm was used, with a case study as research design. Purposive sampling and multiple cases were employed. Semi-structured interviews, participant observation and document analysis served as data-collection instruments, and for data analysis, the researcher relied on thematic analysis. Environmental education initiatives aimed at managing solid waste in the participating primary schools involved providing bins in classrooms and on the school terrain; raising awareness about solid waste and the possibilities of reusing, reducing and recycling it; the burning of such waste (where appropriate), as well as the hosting of events related to solid waste management. Notable challenges to efforts to adopt solid waste management strategies in primary schools include a lack of time to fully implement related initiatives; a lack of funding from non-governmental organisations (NGOs) and government; a shortage of resources such as educational materials and recycling bins; and a lack of training and support from stakeholders such as the Department of Basic Education (DBE) and NGOs. The successful implementation of solid waste management strategies in primary schools requires not only the involvement of learners and teachers, but also that of the DBE and NGOs.

Keywords: Environmental Education, Primary schools, Solid waste, Solid waste management, Waste management theory

ISISHWANKATHELO

Ukulahla inkunkuma yenye yemiba emandla edala impikiswano, ajongene nayo amazwe ngamazwe kwihlabathini liphela. Le ngxaki ibangelwa zizenzo zabantu zemihla ngemihla. Eyona njongo yolu phandontyilazwi ibikukuphonononga ulawulo lwenkunkuma kwizikolo zamabanga aphantsi kwiSithili saseAmathole East eMzantsi Afrika. Iinjongo zophando ibikukuphanda ukuba zeziphi iindlela zolawulo lwenkunkuma ezikhoyo kwizikolo zamabanga aphantsi ebezikhethelwe olu phando, nokucebisa ezona ndlela zilungileyo malunga noku. Ukusilela ekuqubulisaneni nalo mba ngokukhawulezileyo kuya kukhokelela ekuwohlakeni kweemeko zokusingqongileyo, nto leyo enokuba neziphumo ezimbi kwimpilo yabantu. Umphandi usebenzise iThiyori yoLawulo lweNkunkuma (*Waste Management Theory*) nanjengoko ihambelana neenjongo zophando ezikhankanyiweyo. Kusetyenziswe indlela yophando yokufumana ubunzulu obungakumbi ngokukhangela amava neengcamango zomxholo othile wezentlalo, nesifundo ngomzekelo njengoyilo lophando. Kukwasetyenziswe ukukhethwa kwegcuntswana ledatha ngenjongo kunye nezifundo ngemizekelo eziphindaphindiweyo. Udliwanondlebe olucwangcise mayane, ukuqwalaselwa kwabathathinxaxheba kunye nohlalutyo lwamaxwebhu zisebenze njengezixhobo zokuqokelela nokuhlalutya idatha, umphandi uye wathembela nakuhlalutyontyilazwi lomongo okanye lomxholo. Amaphulo ezemfundo yokusingqongileyo ajolise ekulawuleni inkunkuma kwizikolo zamabanga aphantsi ezithatha inxaxheba aquka ukubonelela ngemigqomo kumagumbi okufundela nakummandla wesikolo uwonke; ukwazisa malunga nenkunkuma kunye namathuba okuphinda isetyenziswe, ukuyinciphisa nokuphinda kuveliswe izinto ezintsha ngokutsha kuleyo ibisele isetyenzisiwe; ukutshiswa kwenkunkuma (apho kufaneleke khona), kwakunye nokusingathwa kwemisitho enxulumene nolawulo lwenkunkuma. Imingeni ephawulekayo kwiinzame zokwamkela iindlela zolawulo lwenkunkuma kwizikolo zamabanga aphantsi iquka ukungabikho kwexesha lokufezekisa ngokupheleleyo amaphulo anxulumene noku; ukunqongophala kwenkxasomali evela kwimibutho okanye amaqumrhu angekho phantsi korhulumente (NGOs) kunye norhulumente; ukunqongophala kwezibonelelo ezifana nemathiriyeli yezemfundo kunye nemigqomo yokugcina inkunkuma esele isetyenzisiwe ngenjongo yokuvelisa izinto ezintsha ngokutsha; nokungabikho koqeqesho nenkxaso evela kumahlakani entsebenziswano afana neSebe leMfundo esiSiseko (iDBE) kunye neeNGO. Ukuphunyezwa ngempumelelo kweendlela zolawulo lwenkunkuma kwizikolo

zamabanga aphantsi akufuni ukubandakanyeka kwabafundi nootitshala kuphela, kodwa kukwafuna nenkxaso ye*DBE* kunye nee*NGO*.

Amagama angundoqo: Imfundo yokusingqongileyo, Izikolo zamabanga aphantsi, Inkunkuma, Ulawulo lwenkunkuma, Ithiyori yolawulo lwenkunkuma

OPSOMMING

Die verwydering van soliede afval is 'n ernstige en kontroversiële kwessie wat lande regoor die wêreld in die gesig staar. Hierdie probleem word deur daaglikse menslike aktiwiteite veroorsaak. Die hoofdoel van hierdie kwalitatiewe studie was om die bestuur van soliede afval in primêre skole in die Amathole-Oos Distrik in Suid-Afrika te ondersoek. Die navorsingsdoelwitte was om 'n ondersoek te loods na watter soliede-afvalbestuurstrategieë in plek was in die skole wat deel gevorm het van die steekproef en om ten opsigte hiervan aanbevelings oor beste praktyk te maak. As daar versuim word om betyds op te tree, sal dit aanleiding gee tot 'n agteruitgang in omgewingstoestande wat weer negatiewe gevolge vir menslike gesondheid kan meebring. Die navorser het die Afvalbestuursteorie aangeneem aangesien dit met die genoemde navorsingsdoelwitte ooreengestem het. 'n Interpretatiewe paradigma is in samehang met 'n gevallestudie as navorsingsontwerp gebruik. Doelbewuste steekproefneming en veelvoudige gevalle is gebruik. Semi-gestruktureerde onderhoude, deelnemerobservasie en dokumentanalise het as datainsamelingsinstrumente gedien en die navorser het tematiese ontleding gebruik om dataontleding te doen. Omgewingsleerinisiatiewe wat daarop gemik was om soliede afval in die deelnemende primêre skole te bestuur, het die volgende behels: voorsiening van vullisblikke in klaskamers en op die skoolterrein; bewusmaking oor soliede afval en die moontlikhede van die herbenutting, vermindering en hersiklering daarvan; die uitbrand van sodanige afval (waar gepas); sowel as om geleenthede aan te bied wat met soliede-afvalbestuur verband hou. Opmerklike uitdagings ten opsigte van die pogings om soliede-afvalbestuurstrategieë in primêre skole te laat posvat, sluit in 'n gebrek aan tyd om verwante inisiatiewe ten volle te implementeer; 'n gebrek aan befondsing deur nieregeringsorganisasies (NRO's) en die regering; 'n tekort aan hulpbronne soos opvoedkundige materiaal en hersikleringshouers; en 'n gebrek aan opleiding en ondersteuning deur belanghebbers soos die Departement van Basiese Onderwys (DBO) en NRO's. Die suksesvolle implementering van soliede-afvalbestuurstrategieë in primêre skole vereis nie net die betrokkenheid van leerders en onderwysers nie, maar ook die betrokkenheid van die DBO en NRO's.

Sleutelwoorde: Omgewingsleer, Primêre skole, Soliede afval, Soliede-afvalbestuur, Afvalbestuursteorie.

LIST OF ACRONYMS AND ABBREVIATIONS

AED	Amathole East District
CAPS	Curriculum and Assessment Policy Statement
DEA	Department of Environmental Affairs
DoBE	Department of Basic Education
EC	Eco Centres
EE	Environmental Education
LS	Life Skills
NCS	National Curriculum Statement
NGOs	Non-governmental organisations
NS	Natural Sciences
RA	Republic Act
RQ	Research Question
RSA	Republic of South Africa
SA	South Africa
SOP	Standard Operating Procedures
SS	Social Sciences
SW	Solid Waste
SWM	Solid Waste Management
UNISA	University of South Africa

WESSA Wildlife and Environmental Society of South Africa

WMT Waste Management Theory

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CHAPTER 1: ORIENTATION OF THE STUDY

1.1 INTRODUCTION AND BACKGROUND

One of the most severe and controversial issues facing primary schools globally is solid waste (SW) disposal (Abdel-Shafy and Mansur 2018). Abdel-Shafy and Mansur (2018) pointed out that solid waste management (SWM) is a problem that affects schools globally. Daily human activity causes SW, which varies in rate and composition based on national economies, industrial structures, waste management laws, and lifestyles (Abdel-Shafy and Mansur 2018; Nabor and Cruz 2022). Significant types of SW generated in primary schools are garbage and rubbish. Garbage is perishable SW: bones from meat, peels of fruit or vegetables from feeding schemes and learners' lunch boxes. Rubbish is non-perishable SW, either combustible or non-combustible, including stationery items, pencil sharpening, floor sweepings, aluminium foil, plastic, paper, metal, and glass (Abdel-Shafy and Mansur 2018; Nabor and Cruz 2022). The study explored how the three primary schools around Amathole East District manage solid waste through Environmental Education (EE) initiatives.

SW is defined as waste from day-to-day use of domestic and industrial goods and is hard (Mbelu, Mutua, Kabaria, Amugsi, and Muindi 2020). The Public Cleansing Management Act 2007 of Malaysia defines solid waste as controlled SW from activities which include commercial, household, institutional, and public activities (Chua, Sahid and Leong 2011; Bong, Ho, Hashim, Lim, Ho, Tan, and Lee 2017). Dumpsites and incinerators are used for disposing of SW. The National Environmental Management Waste Act 59 of 2014 of South Africa (SA) defines waste as any substance that is in excess or disposed of which the generator has no more use for production. Olufemi, Ogbonnaya, Mji and Mukhola (2019) describe SWM as the effective monitoring and safe disposal of waste. According to Mbelu et al. (2020), South Africa has been identified along with Kenya and Nigeria that they have primary schools with insufficient and ineffective SW collection, storage, and disposal as one of the environmental problems. If SWM is not standardised, it will negatively impact community health, the local and international environment, the economy, and schools through land, air, and water pollution (Mbelu et al. 2020). From the definitions above, this means that SWM is the general control of SW through the effective collection, proper disposal, and

recycling of SW. In the context of this study, the SWM is meant to keep primary schools safe and clean.

Since learners spend most of their time in school and either carry or purchase pre-packaged meals, there is a greater amount of waste produced at school than at home in South Africa's primary schools (Rada, Bresciani, Girelli, Ragazzi, Schiavonand Torretta 2016). The government is now promoting the education and empowerment of South Africans with regard to integrated pollution and SWM by increasing their awareness in primary schools through various programmes (Matsekoleng 2017). According to the Department of Environmental Affairs (2019), primary schools can engage in the following initiatives: construction of recycling centres, waste transfer stations, and material recovery facilities; development of landfill sites, composting facilities, and street cleaning and beautification. In South Africa, the mere increase in the number of children that have to attend primary schools will result in the generation of more SW (The National Waste Management Strategy 2020). The National Waste Management Strategy (2020) concurred with Chua et al. (2011) on two objectives for proper disposal of SW: maintaining public hygiene and stopping the contamination of the environment and spread of diseases. Public cleanliness may encourage teachers and learners to keep primary schools clean by managing SW. This means primary schools should be encouraged to have a culture of cleanliness through awareness campaigns, training learners to put waste in the bins, not on the ground, recycling, reusing and reducing solid waste, namely papers, plastics and food leftovers. In the classrooms, the disposal of waste into bins needs monitoring as well. By implementing the ways as mentioned earlier of SWM, any contamination shall be controlled and minimized at the primary schools.

According to the National Environmental Management Act, number 59 of 2014, SW in primary schools can be managed through recovery, recycling, reuse, avoidance, and reduction (Department of Environmental Affairs 2019). This means that successfully implementing the strategies of managing SW in primary schools enhances effectiveness in SWM. In Mapotse and Mashiloane's (2017) study in South Africa, primary school learners were involved in recycling, re-using and reducing SW. From the garbage that should be collected from the primary schools, a compost heap may be made, which will benefit the primary school garden. This means that the compost

heap may be used as organic fertilizer, thereby cutting the costs of buying fertilizers and promoting healthy eating through the vegetables in the garden for primary school.

All primary school leaders, for example, principals, School Governing Board members, and School Management Team members can play a crucial part in SWM by educating the learners about environmental issues and inculcating the right values at school (Rada et al. 2016). The higher the environmental awareness known by an individual learner, the more they make conscious decisions that contribute to protecting the school environment (Msezane 2016). This means educating learners about SWM should be an integral part of their education. Primary school learners should be encouraged to dispose of SW in the right places, such as labelled recycling bins. The use of compost heaps, SW debates, talks on SW, and competitions on SW may contribute towards a greater environmental awareness of the importance of SWM (WESSA 2018). Much work in solid waste initiatives has been researched, but not much has been done in the Amathole East District.

1.2 RATIONALE OF THE STUDY

According to the Republic of South Africa (RSA) Constitution (1996), every person has the right to live in a clean environment and have it preserved for current and future generations by laws prohibiting pollution. This study should assist primary schools in implementing the Constitution of the RSA through proper management of SW initiatives or activities. This study will be significant to the Department of Basic Education (DoBE) in assisting the teachers in implementing the Curriculum and Assessment Policy Statement (CAPS) Grade R-12 that envisages environmentally literate learners (DoBE 2011). For example, according to the DoBE (2011), CAPS for Life Skills grade 5, Visual Arts: awareness and value of recycling emphasises that learners should know what to recycle, how to recycle, and why we recycle. Recycling is also taught in grades 4 and 6, per the South African school CAPS (DoBE 2011). The result is that every child and teacher should take responsibility for their SW. Following the CAPS and RSA Constitution, this study should help teachers close the knowledge gap between theory and practice.

1.3 STATEMENT OF THE PROBLEM

The problem addressed in this study was SWM in primary schools because its neglect will lead to a deterioration of the environmental conditions with negative consequences to the learners' healthy living. SW in primary schools can contribute to pest infestation, unhealthy odours, and spillages (Kumar, Smith, Flower, Velis, Kumar, Arya, and Cheeseman 2017). If the vegetables and fruit peels are improperly disposed of and become rotten, they may affect learners' health by producing odour and inviting flies. Primary school learners may injure themselves or each other by metal waste like beverage cans. Inappropriate SWM practices in primary schools in developing countries like South Africa, especially in urban communities, constitute one of the main causes leading to deteriorating health conditions (Kumar et al. 2017). This suggests that in urban areas there are many products namely pre-cooked and pre-packed in or with solid covers such as foods, chips, sweets, plastic bottles, metal cans, variety of fruits and veggies, eaten by learners and used by schools as well. The covers end up being SW after the content has been used.

The consequences of poor SWM in primary school environments are that it makes the environment dirty, untidy and an eyesore. In a study by Ezati, Said, and Ntungwa (2017) in Uganda, Kampala City and Wakiso District stated that illegal dumping areas become breeding grounds for all kinds of pests that affect human health as it is a basic right to live in a clean environment. Kumar et al. (2017) concurs with Ezati et al. (2017) on this view. If the situation is unattended in primary schools, it could lead to the breeding of cockroaches and rats, the primary school's environment becoming dirty and therefore, causing diseases to learners and even the teachers. Despite the many attempts to address poor SWM in schools, the challenge continues because Matsokelong (2017) argued that learners are unaware of SWM in primary schools. Based on the researcher's anecdote, the primary schools around Amathole East District are no exception.

1.4 RESEARCH AIM, QUESTIONS, AND OBJECTIVES

1.4.1 Research aim

To explore solid waste management in primary schools around Amathole East District.

1.4.2 The research questions

The main research question was:

- What EE initiatives are there to address solid waste in primary schools around Amathole East District?

Sub-research questions were:

1. How were EE initiatives used to manage solid waste in primary schools?
2. How successful were the EE initiatives used to manage solid waste in primary schools?
3. What can be done to improve EE initiatives used to manage solid waste in primary schools?

1.4.3 The research objectives

The research objectives were to:

1. To investigate how EE initiatives were used to manage solid waste in primary schools.
2. To describe the successes of EE initiatives used to manage solid waste in primary schools.
3. To determine EE strategies that can be used to improve solid waste management in primary schools.

1.5 LITERATURE REVIEW

A literature review is also defined by Tanczer (2016) as a critical, analytical, and summarised account of the existing research on a particular topic. It is a systematic compilation, classification, and evaluation of what other researchers have written on a particular topic (Hart 2018). Creswell (2017:25) defined literature review as a critical approach that “helps to determine whether the topic is worth studying and provides insight into ways in which the researcher can limit the scope to a needed area of

study”. This literature review was used to provide an organised overview of available information on EE initiatives, their successes, and failures and to inform better school SWM strategies. Literature review sharpens the research focus (Kim 2018). It examined contributions made in EE internationally, nationally, and locally by other researchers in this field. In this study, the researcher looked at existing literature on the definition of solid waste, solid waste management, types of solid waste, impact of solid waste, and solid waste management strategies from different countries.

Internationally, in Southeast Asia, in Indonesia, Sulistyawati, Sukei, Mulasari, Tentama and Djannah (2020) study stated that the SW increase is due to population growth and consumerism in communities where people live. This means as the SW in the community increases due to population increase, SW in primary schools will also increase. The purpose of the Sulistyawati et al. 2020 study was to describe the knowledge, attitude, and practice regarding SWM among primary school learners of Ngoro-oro, Patuk, Gunungkidul, Yogyakarta, Indonesia. The study recommended that knowledge of SWM should be delivered to children at an early age. This should be delivered by inclusion in the syllabus and extracurricular activities, with special emphasis on the disposal of SW such as plastics, paper, or garbage (Sulistyawati et al. 2020). Training children through interesting media like film animation captures their attention and improves understanding.

Matsumoto and Saizen (2017) and Nabor and Cruz (2023) study concurred with the study of Lalamonan and Comighud (2020) in the Philippines that the Republic Act 9003 instructs the local government units to put in place their material recovery facilities that can segregate, reduce SW by composting and recycling SW. Furthermore, the Act highlighted the importance of EE for nurturing awareness and encouraging action among people for SWM. Matsumoto and Saizen (2017) study had the following benefits: Students at elementary schools with EC practised SW segregation and had a sense of responsibility which positively affected students’ littering and SW segregation behaviours; students, teachers, and parents in schools with EC were allowed to practice SW segregation as well as economic benefits realised from selling recycled SW; Schools with better SWM practice showed positive response by having recycling options.

At continental level, Ezati, Said, and Ntungwa's (2017) study was carried out in selected primary schools in Uganda, Kampala City, and Wakiso District learners were taught how to sort solid waste in line with Section 4(4) of the National Environment regulation. The findings from the study by Ezati et al. 2017 were that primary school children are change agents and can also become change agents within their families. They also found that primary school children have a potential for community involvement if they are considered active participants (Ezati et al. 2017).

In South Africa, Mapotse and Mashiloane (2017) conducted a study that aimed to assist the relevant stakeholders in integrating environmental awareness activities into the primary school curriculum to drastically reduce littering in communities. The study used various initiatives, which involved collecting garbage from the primary school kitchen to make compost, preparing the primary school garden from the SW dump site, and picking up SW litter within the school. Teachers and learners needed to work together to enable a successful SWM. In South Africa, Makhubele (2017) also conducted a study within the same year that intended to assess the knowledge, attitudes, and practices of primary school learners with distinct reference to SW recycling. The results from the study showed that learners carefully chosen for the study were interested and alarmed about the state of SW mismanagement in their school environments and communities (Makhubele 2017).

Even though it was the wish of the researcher to conduct literature review relating to the area of the study, namely Amathole East District, relevant literature was not found when this study was conducted. The lack of such literature when this study was conducted testified to the existing gap in research for the area in question and therefore a need for this study.

Theoretical literature

This study used the Waste Management Theory (WMT). The WMT was developed by Eva Pongracz (2002). In this theory, Garcia, Pongracz and Keiski (2004) state that waste represents a loss of valuable resource in the form of material and energy, many of which are scarce. This means that the amount of waste produced at primary schools represents a loss of scarce, valuable resources in materials and energy. Waste management is defined as a set of actions from the beginning of the collection

of waste until the aftercare of waste at the waste disposal sites (Beleya, Ci, and Wen 2019; Garcia et al. 2004; Pongracz 2006). According to Pongracz, Philips, and Keiski (2004) and Pongracz (2002; 2006), WMT is based on the expectation that waste must be prevented from causing harm to both human health and the environment. Waste reduction requires that schools commit themselves to increasing the proportion of non-waste, leaving the waste management process (Pongracz 2002; 2006). WMT also provides an improved understanding of the theoretical breakdown of waste, the activity, and how to minimize the waste through an ecological method (Beleya et al. 2019). Philips, Clarkson, Barnes, and Adams (2002) say that the key to developing a sustainable waste management system is reducing waste at source, in this case, the primary schools.

This study maximised on one of the core values of WMT that it wants to promote resource saving through the application of waste management and resource loss avoidance (Garcia et al. 2004). This assisted the researcher to realise the objectives of the study. WMT was also used to explore SWM in primary schools in the Amathole East District. According to this study, SWM activities include collection, transport, recovery, and process of SW. The overall management also involves strategic planning, having SWM policies, a variety of selections in handling waste, prevention of the pollution of the environment and conservation of resources, and deciding on the most suitable handling choice concerning sustainable effects.

Therefore, this theory was relevant to this study because definitions of SW, related terminology, effects of SW, and strategies to improve SWM were understood through this theory. The researcher adopted this theory because it was in line with the study's objectives, and it also aided in the explanation of the study's results, which focused on strategies of SWM through EE initiatives. Through adopting the WMT as a theoretical framework underpinning this study, learners at primary schools gained a better understanding of SWM in class and outdoors. The learners also explored their abilities and gained a deeper understanding of their capabilities, skills, interests, passion and values through activities like awareness, recycling and fieldwork. This literature review chapter was further explained and discussed broadly in chapter two.

1.6 RESEARCH METHODOLOGY

This section of the study covered the research design and methodology used in conducting this study. According to Babbie and Mouton (2015), research methodology is the researcher's general approach to conducting research. This process involves very detailed methods of data collection, analysis, and interpretation of the collected data. For this study, the research design, research approach, sampling methods and data collection methods that made up the study's research methodology were briefly explained below and further explained in detail in chapter three of the study.

1.6.1.1 Research Paradigm

Research paradigms are referred to as different methods and guidelines for conducting research that have been used by people within the research community for centuries (Kivunja and Kuyini 2017). The logic of inquiry and the philosophy of science are combined to form a paradigm. An allegiance to a set of cultural norms and values defines a paradigm (Hallebone and Priest, 2008). According to Kivunja and Kuyini (2017), research paradigms can also be referred to as methods that scientists use to respond to the three basic questions of ontology, epistemology, and methodological questions.

There are generally three main paradigms in literature: positivism, interpretivism and transformative paradigms (Chilisa 2019). Of these three main paradigms, interpretivism is the paradigm that believes that reality consists of people's subjective experiences of the external world. The origins of the interpretive paradigm lay in the realization that human and social science information is best understood using different methodologies than those employed in the natural sciences since humans interpret their environment rather than having it act upon them. (Pham 2018). Rather than a single truth that can be ascertained by measurement, the interpretive paradigm assumes a relativistic ontology in which a single phenomenon can have different interpretations (Babbie and Mouton 2015; Gemma 2018; Pham 2018).

Considering the nature and characteristics of the interpretive paradigm, this study adopted the interpretivist paradigm as it was in line with the study's objectives to conduct research in a subjective manner and not objectively. The interpretive

paradigm within the study assisted the researcher in understanding people as they interacted when it came to solid waste within the school setting (Babbie and Mouton 2015). In this study, the interpretive paradigm assisted with interpreting data collected from people, texts or documents to understand how SW is managed in primary schools. In this study, the researcher gained a deeper understanding of people in a social context, such as learners at primary schools (Gemma 2018; Pham 2018). According to Pham (2018), the researchers' interpretations, beliefs, ways of thinking, and cultural preferences unquestionably influence research outcomes.

1.6.1.2 Research Approach

Creswell (2017) defined a research approach as a plan and procedure for research that spans the steps from wide-ranging assumptions to comprehensive data collection, analysis, and interpretation approaches. This study used the qualitative research approach since the nature of the study requires interaction between the people and the environment (Creswell 2017). The qualitative research method collects and analyses non-numeric data (text, video, audio, etc.) to understand concepts, opinions, or experiences (Bhandari 2020). Through the qualitative research method, researchers can use it to gain deeper insights into the problem or generate new ideas for their research (Hennink, Hutter, and Bailey 2020). There are benefits of using the qualitative research approach; some include collecting data through open and relaxed communication (Hennink et al. 2020). The qualitative research method allows researchers to investigate and ask detailed questions based on the participant's answers (Bhandari 2020). Secondly, through this research approach, researchers also try to understand the motives and emotions of the respondents (Creswell 2017; Bhandari 2020; Hennink et al. 2020). Understanding how the audience makes decisions can help conclude the study (Hennink et al. 2020).

The research approach chosen was consistent with the study's research questions. This study typically tried to preserve participants' voices and perspectives, and it could be altered when new research questions are developed as advocated by Bhandari (2020). The qualitative research approach also provided flexibility because the data collecting, and analysis method can be modified when new ideas or trends arise. This study benefited from a qualitative research approach because data was collected realistically (Creswell 2017; Bhandari 2020; Hennink et al. 2020). Detailed descriptions

of learners' and teachers' experiences, feelings, and perceptions were also useful in building, testing, or enhancing systems in this study (Creswell 2017; Bhandari 2020). Some disadvantages are that qualitative research data collection methods are expensive and time-consuming to implement; for example, in-depth interviews take longer to administer (Rahman 2020).

1.6.1.3 Research design

Babbie and Mouton (2015) describe research design as a plan or blueprint for conducting research, while Welman, Kruger and Mitchell (2013) described it as the overall plan where respondents and means of data collection of a proposed study are selected. The study used a case study as a research design. A case study is an investigation of a limited system, such as an activity, an event, a process, or individuals, based on broad data collection in a community (Msezane 2016). This study used multiple case studies because there were three different cases or schools to be explored: one in the industrial area, surrounded by informal settlements, one in the town centre and one out of town on a farm. The cases were located in different areas; however, they were still in the Amathole East District and were easily accessible.

Msezane (2016) postulated that a researcher can provide a full interpretation of one or more cases in case study research. In support of Msezane (2016), Yin (2009) and Gustafsson (2017) also added that when conducting multiple case studies, researchers will be able to understand differences and similarities between cases, as well as to analyse the data both within each situation and across situations. Multiple case studies allow for a broader exploration of research questions and theoretical evolution (Gustafsson 2017). Using the case study method, the researcher understood the study in question as it reflected a real-life event involving learners, teachers, and the environment in terms of how SW is managed in primary schools. Further details on the case study are provided in chapter three.

1.6.2 Research methods

1.6.2.1 Population and sampling

According to Ainsworth (2020), a sample is a particular subset of a population that is observed to conclude the makeup of the population as a whole. Makokotlela (2016)

defined a population as all groups involved in activities being studied. In this study, three cases were investigated, meaning that each case represents a single primary school in the Intermediate Phase, which is made up of grades four to six. The sample size of all three cases comprised six teachers and fifteen learners: two teachers, one male and one female and five learners, three girls and two boys, from each of the three schools.

This study adopted purposive sampling as a sampling technique. Purposive or judgmental sampling is a non-probability sampling in which researchers rely on their judgment when choosing members of the population to participate in their study (Foley 2018). Purposive sampling is the “deliberate choice of participants due to qualities they possess” (Etikan, Musa and Alkassim 2016, p.1). This technique was adopted because it was the most relevant to the study’s objectives, is not time-consuming and reduces the chance of errors (Fitzpatrick 2022).

The target population in this study was selected through purposive or judgment sampling representing males and females, as indicated above. Participants were chosen because they are in the intermediate phase, their ability to provide rich information that will answer research questions, and their keen interest in environmental issues. Etikan et al. (2016) state that the researcher requires prior knowledge of the study to approach and choose eligible participants. Foley (2018) stated the benefits of purposive sampling as more information can be squeezed out of the data collected, time, and cost effective. The researcher chose participants who fit a particular profile (Foley 2018). For this study, participants were chosen from the intermediate phase based on their ability to provide rich information that will answer research questions and their keen interest in environmental issues. Teachers were selected from those teaching grades 4 to 6. Also, because of EE content in their curriculum, consideration was given to the teachers teaching any of the following subjects: Natural Sciences and Technology, Social Sciences, Life Skills and Mathematics. The selected learners were from grades 4 to 6 who could give the researcher the required information and had a keen interest in environmental issues.

1.6.2.2 Instrumentation and Data Collection Techniques

Young and Hren (2017) outlined data gathering approaches in qualitative research such as interviews, focus group interviews, observation and textual data. This study focused on participant observation, semi-structured interviews, and document analysis. The researcher prepared the semi-structured interview questions, observation sheets, and document analysis. Data were stored as hard copies and electronically on cell phones, digital cameras, and laptops.

1.6.2.2.1 Interview

An interview is a well-known way of collecting qualitative data since it utilises verbal communication. Respondents may be close to nearby and ready to partake (Griffiee 2018). This study used semi-structured interview questions. The researcher came up with a list of questions and could also ask follow-up questions for participants to provide accurate information. An interview schedule with questions was prepared. The researcher piloted the interview questions to one teacher per school from each of the three primary schools. The researcher probed the participants to elicit information that would assist in answering the research question. Three teachers were interviewed after editing the piloted questions.

1.6.2.2.2 Participant Observation

Observation involves collecting information without asking questions and allows the observer to add judgment to the data (Ainsworth 2020). There are two types of observation methods, namely participant and non-participant observation. Participant observation was used in the study to gather data because it is a useful tool for measuring scenario dynamics, which cannot be obtained through other methods such as document analysis and interviews (Ainsworth 2020). Participant observation offers the researcher a greater understanding of what is being studied, though it can change the behaviour of the other participants (Ferguson 2018). This study used participant observation for data collection during class and break times. As a participant observer in this study, the researcher actively participated in all activities and joined the participants as they interacted with the environment. The researcher was actively involved in all class and outdoor activities, and notes were taken during and after observation.

The researcher used a camera to take pictures and observation sheets to record the behaviour of primary learners and teachers during class and break time. The behaviour may show actions and how the participants manage SW in class and out-of-class situations. The researcher observed primary school learners' and teachers' behaviours towards SW from three different schools during break time and lesson time to collect data. The break time was used because participants were free to interact with each other and the environment. Covid-19 restrictions were observed as stated by the Department of Basic Education ([DoE] 2020) Standard operating procedures (SOP) of 2020. The DoBE SOP of 2020 states that no visitors are allowed at schools unless it is very important; signing a register on entry, wearing masks, sanitizing hands and observing social distancing are important to anyone visiting a school. During a lesson, observations were used to check what happens in the classroom regarding curriculum delivery on SWM. The data collected from observation was added to the data collected through interviews and document analysis.

1.6.2.2.3 Document analysis

Bowen (2009) defines document analysis as an orderly way of reviewing or evaluating documents, both hardcopy and softcopy material. During the document analysis, the researcher used the learners' class workbooks through the teachers. Learners' books, textbooks, CAPS documents, and school policies about SW and the South African Constitution were used in this study to explore how EE initiatives are being implemented in the classroom.

1.6.3 Data analysis and interpretation

The process of giving the gathered data structure, order, and significance is known as data analysis (Creswell 2017). According to Chapman (2018), data analysis encompasses a variety of techniques and methods used to transform the qualitative data gathered into an explanation, comprehension, and interpretation of the subjects and circumstances under study. Since the goal of data analysis is to look at the symbolic and meaningful content of qualitative data, it is founded on an interpretive philosophy (Chapman 2018). Analysing documents includes coding content into themes, and a rubric may be used to mark a document (Bowen 2009). Bowen (2009) outlined the following three primary types of documents: public records, personal documents, and physical evidence.

This study used thematic analysis to analyse qualitative data gathered through semi-structured interviews, participant observation and document analysis. Caulfield (2022) defined thematic analysis as a method of analysing qualitative data where the researcher closely examines the data to identify common themes or ideas and patterns of meaning that come up repeatedly. An inductive approach was used to analyse the qualitative data collected. An inductive method includes letting the data control your themes (Caulfield 2022). Details will be provided in chapter three.

1.6.4 Trustworthiness

According to Korstjens and Moser (2018), all studies must address canons that serve as standards by which the project's credibility can be assessed. These canons can be phrased as questions to which all research must respond. Korstjens and Moser (2018) listed the four as credibility, transferability, confirmability, and dependability. The study's truth value, applicability, consistency, and neutrality are established by these questions, according to Korstjens and Moser (2018). The researcher used qualitative data collection procedures like interviews, document analysis and observations to bring credible and dependable results. This was achieved through persistent observation and member check strategies. The researcher built a trusting relationship with participants by staying in that school for a long time. In this study, the same participants were interviewed and observed several times to check consistency. Using different data collection methods, such as triangulation techniques, ensured trustworthiness.

1.6.5 Research ethics

The study observed research ethics. The researcher applied for ethical clearance from the University of South Africa Ethics Committee before commencing with data collection. Also, the researcher applied for permission to conduct research from the Eastern Cape Provincial Education. Permission was sought from the Amathole East District through the District Director and 3 School principals. Since the learners were under the age of 18, first consent was requested from the parents by signing the parental consent forms. Learners signed assent forms after their parents had permitted them to participate in the study through consent forms. For participation in this study, teachers signed consent forms. In the observation process, the participants

were mainly learners, while in the document analysis, interview, and observation process, the participants were mostly teachers.

A total of six teachers were interviewed, two from each school. The researcher ensured that no participant was coerced. Participation was voluntary for all participants (Arifin 2018). Participants were informed of their rights to withdraw should they feel uncomfortable with the research. The researcher made sure to respect participants' integrity, dignity, culture, privacy, confidentiality, and rights (Arifin 2018). All answers given were not disclosed to anyone. In other words, participation was anonymous, and the information was kept confidential (Arifin 2018). In this study, to achieve transparency, the researcher was honest and open to all the participants at all stages of the research by clearly briefing them on the aims, implications, possible outcomes, and benefits of the research (Aguinis and Solarino 2019).

1.7 LIMITATIONS AND DELIMITATIONS OF THE STUDY

1.7.1 Limitations of the study

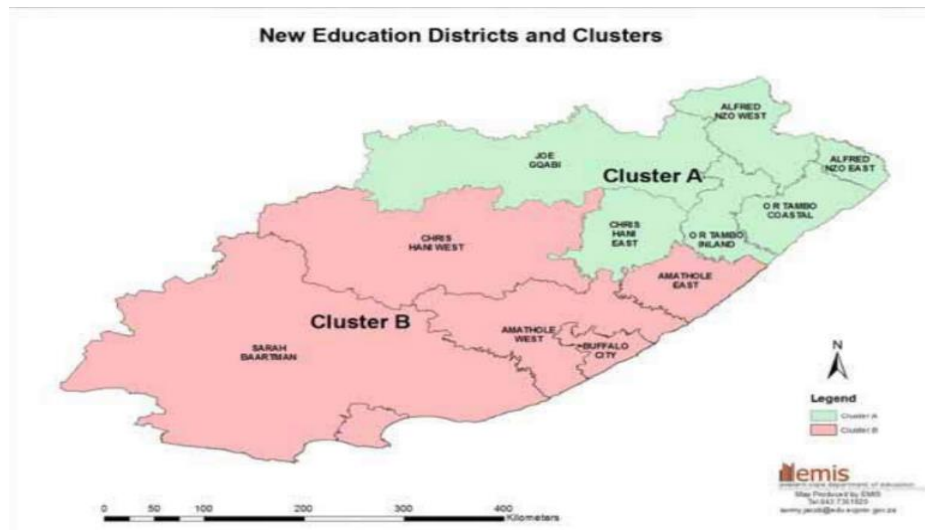
Limitations are reasons out of the researcher's control that may disturb the study results (Theofanidis and Fountaiki 2018). This study defined limitations as circumstances out of the researcher's control that may control and disrupt a study. In this study, responses from primary schools selected for data collection were slow, resulting in delays in data collection. Due to COVID-19 school restrictions, the researcher could not interview learners to get their view of SWM. Lack of adequate time and funding impacted the option of choosing more schools and more participants, which would have given a better opportunity to gather data from a broader population.

1.7.2 Delimitations of the study

Delimitations of the study are those features that arise from limitations in the scope of the study and from the mindful exclusionary and inclusionary decisions made during the improvement of the study plan (Theofanidis and Fountaiki 2018). The research is limited to Amathole East District, one of Eastern Cape's busiest districts. It is between two towns, East London and Mthatha. Amathole East District comprises small towns, namely Butterworth, Idutywa, Nqamakwe and Centane. The district has about 484 primary schools. The study only focused on implementing EE initiatives in three

primary schools in the Amathole East District. The research site mentioned above is explained in the figure below:

**Figure 1.1: Map of Eastern Cape Province showing Amathole East district:
Source: Google maps**



There are 12 districts in Eastern Cape Province as indicated in the map above. These districts are categorised into two clusters namely, Cluster A and B.

1.8 DEFINITION OF KEY CONCEPTS

Environmental education: “a process of education that broadens people's understanding of the environment and the problems it faces, equips them with the knowledge and abilities to deal with those problems, and cultivates the attitudes, drives, and commitment needed to make wise choices and carry out responsible deeds (Karama 2016, p.2).

Population refers to groups that are involved in activities that are being studied (Makokotlela 2016).

Recycling: the practice of gathering and altering old paper, glass and plastic so that they can be used again (Mebunii 2022)

Sample: Ainsworth (2020) defined a sample as a special subset of a population that is observed to make inferences about the nature of the total population itself.

Solid waste: Solid waste is defined as waste from day-to-day use of domestic goods and industrial goods and is hard in nature (Mbelu, Mutua, Kabaria, Amugsi and Muindi 2020).

1.9 CHAPTER-OUTLINE

Chapter 1: Introduction

In Chapter 1, the introduction of the study is done through the background of the problem, the rationale of the study, the problem statement, the research aim, the purpose and objectives, a brief description of the literature review, the research methodology, limitations, delimitations and the chapter layout.

Chapter 2: Literature Review

Focuses on the literature of the study and assesses the relationship between important terms and concepts such as solid waste, solid waste management and environmental education initiatives. This implies that EE initiatives are discussed in detail in Chapter 2. The theoretical framework is described thoroughly in Chapter 2.

Chapter 3: Research Methods

In this chapter, the research approach, design and data collection methods are outlined in detail. A qualitative research approach was used. The research design utilised is a multiple case study. Interviews and observations were used as data collection methods.

Chapter 4: Data presentation, findings and discussion

Findings and interpretation of results are presented in this chapter. Findings based on the multiple case study research of primary schools on EE initiatives being implemented will be discussed in detail.

Chapter 5: Conclusions, recommendations and limitations of the study.

This chapter concludes from the research study and presents the major recommendations formulated from the research findings in Chapter 5. The recommendations are meant for the Department of Basic Education and broadly at all schools worldwide.

1.10 CHAPTER SUMMARY

The study explored EE initiatives utilised in primary schools to improve solid waste management. This chapter covered the problem statement, background, significance, aims and objectives of the study, and methodology. It highlights the limitations and chapter outlines. The next chapter dealt with theoretical frameworks and literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

According to Creswell (2017, p. 25), a literature review is a vital method that "provides insight into ways the researcher can limit the scope to a needed area of study and helps determine whether the topic is worth studying." A literature review is also defined by Tanczer (2016) as a critical, analytical and summary of the literature already published on a given subject. It is an organized list, categorization, and assessment of previous studies on a specific subject by other scholars (Hart 2018). Researchers can change a study idea into a compelling research question with help from studying the literature early in the research process (Akhtar 2021; Kodah 2017). The literature review can help the researcher determine how intriguing a research question is if they have already addressed it, as well as give them advice on how to carry out their study and explain how it fits (Akhtar 2021; Kodah 2017). Creswell (2017) pointed out that a literature review sets boundaries for research. The literature review also sharpens the research focus (Kim 2018). Based on the definitions above, scholars such as Tanczer (2016), Creswell (2017), and Hart (2018) agree that a literature review limits the scope of a particular topic. Kodah (2017) and Akhtar (2021) also agree by emphasising that literature review requires thoroughly studying the appropriate literature to accommodate the research question. Kim (2018) further agrees with Creswell (2017) that a literature review sharpens the research focus. This study defines a literature review as a logical explanation of relevant and current literature related to the study as expressed by other scholars. The contributions to SWM made by other scholars on this topic were examined in the review of existing literature.

The problem of solid waste in the context of EE in primary schools was explored in this chapter, using existing literature. SWM challenges have been mentioned in many studies by different researchers. These challenges are rapidly increasing as the population grows because there is an increasing problem of managing SW; primary schools are affected by this as well (Debrah, Vidal, and Dinis 2017; Makhubele 2017; Mapotse and Mashiloane 2017; Abdel-Shafy and Mansur 2018; Das, Lee, Kumar, Kim, Lee, and Bhattacharya, 2019; Raghu, and Rodrigues, 2020; Abubakar,

Maniruzzaman, Dano, AlShihri, AlShammari, Ahmed, Al-Gehlani, and Alrawaf, 2022). Researchers have recommended SWM strategies, but the problem still exists (Kumar, Smith, Flower, Velis, Kumar, Arya, and Cheeseman 2017). According to Kumar et al. (2017), poor and non-implementation of prescribed solutions is a major setback in the success of SWM. Also, a lack of cooperation or willingness and the non-availability of resources in some primary schools hinder the successful implementation of SWM strategies (Kumar et al. 2017). The researcher concurs with the scholars in this study, Kumar et al. (2017); Das et al. (2019); Raghu, and Rodrigues, (2020); Debrah et al. (2021); Abubakar et al. (2022) that the SWM challenges increase as the population increases. Also, lack of SWM resources and negative attitudes in primary schools hinder progress in implementing SWM strategies.

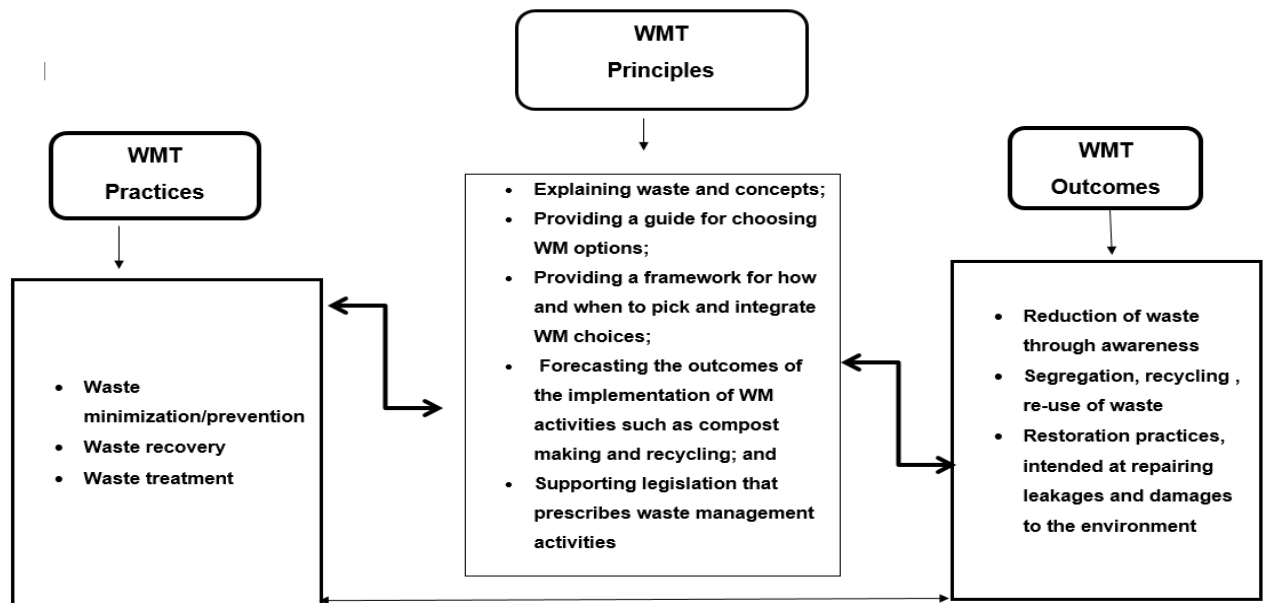
SWM in primary schools can be improved if there is effective awareness that will stimulate cooperation from teachers and learners, availability of resources and the implementation of SWM strategies (Debrah et al. 2021). The context of this study is based and focused on SWM initiatives that involve educators and learners in primary schools in the Amathole East district. Within the context of this study, primary school teachers and learners should understand successful SWM initiatives in their school environment. This is because poor SWM initiatives would result in an unhealthy environment and defeat the aspiration of the Constitution of the Republic of South Africa (1996), which advocates for a healthy environment for all. As stated above, understanding SWM is expected to be gained through initiatives and activities provided by teachers that will take place in the classroom and as outdoor activities at school because the Curriculum and Assessment Policy Statement (CAPS) supports SWM through recycling (DoBE 2011).

The chapter was prepared on topics that cover concepts of SWM, and the relevant literature on SWM initiatives was reviewed. Some of the core concepts used in this study were SW, SWM, SWM initiatives, environmental education, and primary schools. The theory and concepts underpinning this study are explained below.

2.2 THEORETICAL FRAMEWORK

Eva Pongracz (2002) established the Waste Management Theory (WMT), which was incorporated into the study. Garcia, Pongracz, and Keiski (2004) identify waste as a loss of resources in material and energy form, some of which are scarce. In the context of this study, waste management is defined as a series of acts performed from the beginning of waste collection to the end of waste disposal (Garcia et al. 2004; Pongracz 2006; Beleya, Ci, and Wen 2019). Pongracz, Philips, and Keiski (2004) and Pongracz (2002, 2006) state that WMT is predicated on the idea that waste needs to be kept from endangering the environment and human health. Primary schools must increase their share of the non-waste production process to reduce waste (Pongracz 2002; 2006; Maleka, Nyirenda and Fakoya 2017). Additionally, WMT offers a better understanding of the activity, the theoretical breakdown of waste, and how to reduce waste using an ecological approach (Beleya et al. 2019). Reducing waste, particularly waste at source, is essential to building a sustainable waste management system, according to Phillips, Clarkson, Barnes, and Adams (2002). For this study, the source of SW refers to the primary school. Scholars like Philips et al. (2002), Pongracz et al. (2004), and Beleyah et al. (2019) argue that WMT aims to reduce SW at the source. The researcher agrees with the WMT that it focuses mainly on SWM reduction from where the SW has been generated. As per Garcia et al. (2004) and Pongracz (2002), the practical principles of WMT include explaining waste and its concepts, offering guidance on WM options; establishing a framework for the appropriate selection and integration of WM choices; projecting the results of WM activities like recycling and composting; and endorsing laws that control waste management practices. The WMT is explained in the figure below:

Figure 2.1: Diagram representing Waste Management Theory (adapted from Pongracz (2002)).



The diagram shows that WMT has five principles, three practices and various outcomes. The principles are important in applying the WM practices in managing SW in primary schools. Lagman-Bautista (2020) classified waste practices as prevention, recovery and treatment. According to Lagman-Bautista (2020), waste practices are further elaborated as prevention practices, which include methods for minimizing waste, such as waste awareness. Recovery practices are end-of-pipe strategies that recover the waste's economic value through waste separation, recycling, appropriate landfilling, and incineration, whilst treatment practices are environmental restoration techniques meant to fix leaks and environmental damage (Lagman-Bautista 2020). This study aligned WMT principles with EE initiatives to manage SW in primary schools. For example, SWM awareness and SWM events were used as prevention practices. Segregation, burning, recycling and reuse of SW were used as waste minimization practices, whilst compost-making and biogas production plants were used as treatment practices.

The WMT also aims to promote resource saving through waste management and resource loss avoidance (Garcia et al. 2004; Pongracz and Pohjola 2004). This means that in this study, learners and teachers should be able to explain the meaning of waste and the related concepts like SW, SWM, types of SW, effects and strategies of SWM. The primary school should be able to draft a SWM policy to guide them. This policy

should stipulate how and when to pick SW and how to integrate SWM into the curriculum. The primary schools should be able to plan and implement SWM initiatives such as compost making and recycling and compare the plan versus the implementation. In the planning and implementation, the primary schools should be able to adhere to the legislation prescribed for SWM activities. This study focused on the concepts of SWM, investigated the initiatives implemented by the three schools, and suggested what can be done to improve SWM in primary schools.

This theory explored SWM in primary schools in the Amathole East District. According to this study, SWM activities include collection, transport, recovery, and processing of SW. In addition, the overall management includes strategic planning, SWM policies, a range of waste management options, preventing environmental pollution, conserving resources, and selecting the best handling option while considering long-term impacts. The researcher adopted this theory because it aligned with the study's objectives. Therefore, the WMT was also relevant to the study to explain the findings, which focused on SWM through EE initiatives. Hence, from the relevance mentioned above of the WMT, it can be understood that with the theory of WM as a theoretical framework underpinning this study, learners and teachers at primary school are expected to understand SWM in class and outdoors. For example, in the Natural sciences grade, six learners are taught about using recycled material to build an electrical circuit (DoBE 2011). In the study, SW was picked from the primary schools and used to make other goods, such as electrical circuits.

2.3 CONCEPTUAL LITERATURE

The conceptual literature that underpinned this study was based on the following concepts: waste, solid waste, solid waste management, environmental education, primary school, and initiatives, as explained below:

Waste

According to Noiki, Afolalu, Yusuf, Emeter, Ongbali, Oloyede, Joseph, and Banjo (2021), waste is defined as unwanted, cast, rejected, surplus material anticipated for recovery, reuse, reconditioning, or purification by an independent process from the same source material. According to Peng, Jiang, Chen, Osman, Farghali, Rooney,

and Yap (2023), waste is divided into four categories: municipal solid waste, industrial waste, electronic waste, and medical waste. Garcia et al. (2004) claimed that waste is a loss of resource that is both valuable and rare in the form of material. Garcia et al. (2004) and Noiki et al. (2021) maintain that waste is valuable. In this study, waste refers to the unwanted material found at primary schools.

Solid waste

Other scholars define SW as waste from day-to-day use of domestic and industrial goods and is hard (Mbelu, Mutua, Kabaria, Amugsi, and Muindi 2020; Nabor and Cruz 2023). SW is also defined as undesirable and useless abandoned garbage from human activities thrown away (Sulistyawati, Sukesi, Mulasari, Tentama, and Djannah 2020). Sulistyawati et al. (2020); Nabor and Cruz (2023) also opined that SW is any neglected litter or garbage and other unwanted material resulting from business or school operations and community activities. Mbelu et al. (2020) and Sulistyawati et al. (2020) claim that SW is abandoned and leftover after use. From the definitions as mentioned earlier of SW, it can be understood that solid waste in primary schools is any type of goods that are no longer useful to primary school teachers, learners, and any other persons who are within the school premises, for example, leftover food, plastic containers, bottles, paper and beverage cans disposed of by primary school teachers and learners.

Solid Waste Management

Bueno (2019) defined SWM as the effective monitoring and safe disposal of SW. In other words, this is checking the whole process from SW collection, separation, and disposal of SW to relevant stations. SWM is also defined by Makhubele (2017), Lalamonan and Comighud (2020), Nabor and Cruz (2023) as the creation, collection, storage, transportation, processing, and disposal of SW to a designated approved dump, with the primary goal of protecting the environment and public health. The country's constitution mandates South African primary schools through The Bill of Rights to provide an environment that is not harmful to anyone; this means that students therefore view waste management as a necessary service (Constitution of South Africa 1996). Disease epidemics, environmental pollution, and dilapidation can occur if this function is not carried out (Sulistyawati et al. 2020). Scholars such as Makhubele (2017), Bueno (2019), and Lalamonan and Comighud (2020) agree that

SWM leads to the safe disposal of SW. On the other hand, Sulistyawati et al. (2020) expanded the meaning with a warning that if SW is poorly managed, it can harm the environment.

Environmental education

According to Karama (2016), environmental education is "a process that broadens people's understanding of the environment and the problems it faces, helps them acquire the knowledge and skills they need to deal with those problems, and cultivates attitudes, motivations, and a commitment to making wise decisions and acting responsibly." The above definition suggests that primary school teachers and learners are educated and will likely know more about their environment by practically being involved in SWM practices at their primary school and can take initiatives to improve SWM.

Primary school

A school is an educational establishment that registers learners in one or more grades from grades R to 12 (DoBE 2011). According to DoBE (2011), in South Africa, primary schools enrol children between the ages of 5 to 11 for formal education, that is, grades R to 6. In addition, a primary school has two phases: the foundation phase, which has grades R to 3 and the intermediate phase, which has grades 4 to 6. In this study, the researcher focused on the intermediate phase. SWM through EE initiatives was explored in primary schools in the Amathole East district. For this study, primary schools are very important as this is where the child's environmental education foundation is constructed directly and indirectly through the subjects they are being taught, like Life Skills, Mathematics, Languages, Natural Sciences and Technology, and Social Sciences (Fonllem, Sing, Verdugo, Teran and Barahona 2020). Internationally, primary schools may be called elementary schools, grade schools, or junior schools. In countries like the Philippines, they are called elementary schools (Granada 2021).

Initiative

This study defined an initiative as a planned solution for a problem. This means that EE initiatives are used to solve SWM problems in schools. Activities like SWM awareness campaigns, installing recycling bins, and composting are some of the

suggested initiatives that can improve SWM primary schools (Ezati, Said, and Ntungwa 2017; Matsumoto and Saizen 2017).

2.4 LITERATURE REVIEW

A literature review is a summary of the findings of other researchers on a related subject; it is thus presented to illustrate the findings of other studies on related subjects (Nakano and Muniz 2018; Elrienanto 2019). The literature for this study reviewed similar studies by other scholars. The reviewed literature covered opinions of international, continental, and local scholars on SWM through EE initiatives in primary schools. It also explored the contributions of Non-Governmental Organisations (NGOs) in SWM in primary schools. They are explained below:

2.4 INTERNATIONAL SCHOLARS' VIEWS

The researcher reviewed the literature on EE initiatives in primary schools in the Philippines and Indonesia.

2.4.1 Solid Waste Management through EE initiatives in Philippines primary schools

The increase in SW due to population increase and urbanisation has made SWM popular in the Philippines in Asia, resulting in the government putting new laws decentralising the management of SW (Matsumoto and Saizen 2017; Coracero, Gallego, Frago, and Gonzales 2021). Matsumoto and Saizen's (2017) study in the Philippines was to evaluate school ecological centres (EC) and their impact on elementary schools in Calamba City. In other countries, elementary schools are called primary schools and have grades one to six. The main purpose of the study by Matsumoto and Saizen (2017) in the Philippines was to educate students about the importance of segregating SW and installing ecological -centres in each primary school. Matsumoto and Saizen (2017); Coracero et al. (2021) and Nabor and Cruz (2023) study stated that in the Philippines, the Republic Act 9003 instructs the local government units to install their material recovery facilities in order to decrease SW and segregate SW by compost making and recycling SW. It was intended to promote

source reduction and recycling by including a recycling facility, a compost-making facility, a drop-off centre, and a SW transfer or sorting station in each collection (Matsumoto and Saizen 2017; Alvarez 2022).

Successes of the Matsumoto and Saizen (2017) investigation included the following findings: Students' littering and SW segregation behaviours were positively impacted by the practice of SW segregation and the sense of responsibility that elementary school students with EC possessed; Students, teachers, and parents in schools with EC were allowed to practice SW segregation as well as economic benefits realised from selling recycled SW; Schools with better SWM practice showed positive response by having recycling options. On the other side, according to Matsumoto and Saizen's (2017) study, the following findings were challenges: there were financial and institutional challenges in starting the SW EC, and this limited Calamba city to segregation of SW; Lack of implementation and enforcement of the Republic Act 9003 to control solid waste was observed in many primary schools.

The purpose of Lalamonan and Comighud's (2020) study was to ascertain the respondents' awareness of and degree of application of SWM practices in the Philippines' Bayawan City Division. Additionally, the study looked into whether or not SWM practices improved the city and the community. The level of respondents' awareness and the extent to which SWM procedures are implemented are correspondingly extremely high and very great according to all areas and when they are categorized according to sex, school size, and school location, according to Lalamonan and Comighud's (2020) study findings. The success of this study was that respondents were knowledgeable about the SWM practices. The degree of respondents' awareness of SWM practices varies significantly depending on the location and size of the institution. Lack of implementation and lack of effective SWM programmes were identified as challenges. In order to encourage environmental awareness and action among the public, Lalamonan and Comighud (2020); Coracero et al. (2021) recommended that schools continue to run SWM practices information campaigns and further strengthen the integration of environmental concerns in the curriculum, with a focus on the theories and practices of WM principles like segregation at source, reduction, recycling, reuse, and compost making. Awareness of SWM Practices in primary schools should be increased to accomplish the desired

results. SWM programmes and advocacy should be strengthened even further to be more successful. Equal emphasis and care should be paid to proper implementation.

In order to determine the intermediate phase learners' degree of knowledge regarding the school's waste management programme and clean grounds, Sanchez, Cudal, and Saplalad (2019) conducted a study in Butuan City, Philippines. The learners were grades 4 to 6. The study conducted by Sanchez et al. (2019) highlighted that schools have a responsibility to help youth become future-ready by integrating effective SWM activities into school policies and instilling in them the value of these initiatives at an early age. Sanchez et al. (2019) found that learners knew about clean grounds and SWM programmes. SWM awareness among teachers and students was the most effective way of managing SW in primary schools. This suggests that teachers' and students SWM awareness should be prioritized for the successful management of SW. The following SW initiatives were listed by Sanchez et al. (2019) study: conduct quizzes or contests regarding SWM; develop instructional materials in science using paper and cartons; implement EE in all subjects; more engage in implementing R.A 9003; encourage each family to teach their child at home regarding SWM. When implemented correctly in primary schools, the SW initiatives mentioned will solve the challenge of poor SWM.

Matsumoto and Saizen (2017) study concurred with the study of Sanchez et al. (2019) and Lalamonan and Comighud (2020) in the Philippines that the Republic Act 9003 instructs the local government units to put in place their material recovery facilities that can segregate, reduce SW by composting and recycling SW. Sanchez et al.'s (2019) study concurred with Matsumoto and Saizen's (2017); Coracero et al. (2021) study that it is the role of the schools to prepare young people for the future by inculcating the importance of good SWM initiatives while they are still young and includes this in the school policies. From the above analysis of different studies, it can be concluded that learners were expected to play a very important role in SWM under the guidance of their teachers. Learner involvement and participation are important for the success of SWM in primary school. After taking into consideration what is mentioned above, primary school learners must be educated about SW, SWM, and the importance of participation thereof as highlighted in the study by Matsumoto and Saizen (2017), Lalamonan and Comighud (2020); Sanchez et al. (2019). From the above studies, it

can be understood that the lack of financial resources to support the SWM initiative and not putting it into practice in these primary schools hampered the progress being made. Therefore, the researcher needs to take note of these failures and account for them before the study to ensure a smooth implementation of these initiatives in primary schools.

2.4.2 Solid Waste Management through EE initiatives in Indonesia primary schools

SWM has been a serious challenge in Indonesia and Southeast Asia because of the inadequate SWM system and lack of SW individual awareness (Syakura, Tomita, and Madani 2020). Syakura et al. (2020) stated that poor SWM is not only rampant in uneducated communities, but it is also rife in educational institutions, especially primary schools. Sulistyawati et al. (2020) in Indonesia stated that the SW increase is due to population growth and consumerism in communities where people live. This will, therefore, mean that as the SW in the community increases, it will also increase in primary schools due to an increase in population.

Syakura et al.'s (2020) study examined primary schools in Indonesia and Japan to determine whether the inclusion of *gakko soji* in curricula contributes to the formation of anti-littering attitudes. A study conducted in Japan showed that SWM relies on students than in Indonesia, where they rely on cleaners (Syakura et al. 2020). Syakura et al. (2020) study found that Indonesian schools use more cleaning staff than Japan. There are shifts for learners to clean the schools in Indonesian schools but at a lower level than in Japan. The other finding was that cleaning in Japanese schools was standardised and equal among learners than in Indonesian schools, where it is flexible and depends on the teacher on duty. There was an attitude gap, and the school curriculum was not the only reason for the attitude gap; others, like the non-availability of trash bins, contributed. SWM through school cleaning depends on teachers and individual initiatives. Syakura et al. (2020) and Hernawan, Darmawan and Ali (2021) concur with Sulistyawati et al. (2020) that for the success of SWM primary school learners need to be practically involved in all stages. Learners should take an active role in the SWM in primary schools. The inclusion of SWM in the school curriculum and the use of correct teaching methods influence learners to be effective SW managers.

The study by Sulistyawati et al. (2020) set out to characterize the knowledge, attitudes, and practices of primary school learners in Ngoro-oro, Patuk, Gunungkidul, and Yogyakarta, Indonesia, concerning SWM. Understanding SW by primary school learners was enhanced by the interventions made in Sulistyawati et al. (2020) study. Sulistyawati et al. (2020) study found that knowledge of waste management was lacking in some cases and recommended that training children through interesting media like film animation captures their attention and improves understanding. The use of visual aids and audio-visuals in teaching children about SWM creates a positive impact as they are not boring (Posmaningsih, Aryasih, Hadi, Marwati, and Mallongi 2018; Sulistyawati et al. 2020).

Sulistyawati et al. (2020) study and Syakura et al. (2020) study recommended that knowledge of SWM should be delivered to children early. Future waste reduction can be done by adopting excellent SWM practices and inculcating it at an early age. This should be delivered by inclusion in the syllabus and extracurricular activities, with special emphasis on the disposal of solid waste such as plastics, paper, or garbage (Sulistyawati et al. 2020). Riastini, Wati, Prodjasontoso, and Suryadarma (2019) emphasised that strengthening the regulation about using the SW, like organic and inorganic, is more useful than changing it to an energy source. Sulistyawati et al. (2020) study concluded that strengthening the school curriculum with SWM content is required as an investment for future generations. Also, having proper SWM facilities in primary schools will create interest in children for practising their SWM attitude and knowledge.

Syakura et al. (2020) study concurs with Sulistyawati et al. (2020) study in Indonesia that considering EE in the primary school education programme is a critical activity to address SW. Bueno (2016) and Sukma, Ramadhan, and Indriyani (2020) also weighed in and voiced that teachers play a very important role in influencing primary school learners to become future leaders in environmental advocacy, especially when dealing with SWM. This means that if learners are taught about SWM at a very young age, it will help solve the problem of SW.

2.5 CONTINENTAL SCHOLARS' VIEWS

The researcher reviewed literature from some African countries on the following EE initiatives in schools in general and primary schools in Uganda and Ghana:

2.5.1 Solid Waste Management through EE initiatives in Uganda primary schools

In a study carried out in selected primary schools in Uganda, Kampala City and Wakiso District by Ezati et al. (2017), learners were taught how to sort solid waste in line with Section 4(4) of the National Environment (waste management) regulation (Ezati et al. 2017). The findings indicate that learners in primary schools can effect change within their own families and in larger society. Children can also be used as stimulants to huge developments within the community if they are brought up as active participants. Therefore, as eluded by Ezati et al. (2017), children learn about SW from other children whom they admire, copy and listen to older children, which is why it is important to teach them the right ways of doing things to equip them from a young age to become change agents within their communities.

The following explains the study results of Ezati et al. (2017): the four primary schools' chief sources of SW were dry grass, leaves, papers, plastic paper, and food scraps. After completing the project, students' behaviour changed; they could sort rubbish, dispose of it appropriately, and even reuse part of it. Through the project, the learners could study and encounter subjects they would have only learned about theoretically in school. In order to be sold to recycling businesses, plastic bottles are gathered and stored at Bukoto Muslim Primary School and Buganda Road. Schools consequently receive less revenue from SW. The study conducted by Ezati et al. (2017) developed several SWM initiatives, such as providing non-degradable and degradable SW disposal containers to all KCCA schools so they can sort SW. This suggests that the involvement of primary school learners practically is important as they are learning about SWM while collecting, sorting, reusing, recycling, and storing SW at their schools. Therefore, the learners' behaviour would change by managing SW effectively at their primary schools.

Kandole (2021) agreed with Ezati et al. (2017) in a different study conducted in Kampala, Uganda, stating that since primary schools play a crucial role in our communities, cultivating strategies to lessen SW must begin here in order for kids to acquire the knowledge and skills they need to contribute to their communities. Promoting and maintaining appropriate SWM practices and environmental awareness in Kampala, Uganda's schools and communities is the goal of ECO action and its partners, which include Sustainable Futures in Africa Network, Kampala City Council Authority, Makerere University, Design hub Kampala, and the US Embassy. The team wants to show educators and learners how to improve their school, community, and environment by reducing, reusing, and recycling SW (Kandole 2021). Kandole (2021) specified that the objective of this manual is to build upon ECO action's efforts to sensitize school children to environmental awareness. The guidebook provides step-by-step directions, curricular theme links, and examples for two flexible and adaptable classroom projects (Kandole 2021). Kandole (2021) outlines the following initiatives: Learners were taught how to make potted plants from plastic bottles. Learners used fertile soil from compost to plant seeds or seedlings into the made plant pots. This means that subjects like mathematics, science, English, and social sciences were integrated into making plant pots, using compost, counting seeds, and recycling plastic bottles. Also, learners learned how to make waste bins using plastic bottles, bamboo or wooden stick strips, nails, and a hammer. Subjects like mathematics, science, English, social sciences, and technology were reinforced through counting bottles, sorting colours, shapes, and sizes of bottles, and making things like the SW bin. This means that the inclusion of EE across the curriculum, will positively impact SWM in primary schools.

The scholars Ezati et al. (2017) and Kandole (2021) agree on the involvement of children in promoting SWM in primary schools. Also notable in these studies was t learners how to segregate SW. In Kandole's (2021) study the SW collected was integrated in the curriculum by making plant pots and waste bins with plastic bottles. This means that subjects taught at primary schools like Languages, SS, NST and Mathematics, were involved in the management of SW by making waste plastic bins and plant pots. However, Ezati's (2017) study concentrated on the recycling and selling recyclable material identified from SWM.

2.5.2 Solid Waste Management through EE initiatives in Ghana primary schools

The goal of Aforo's (2020) study in Ghana's Dormaa Municipality was to determine basic schools' understanding of SWM procedures, as SWM practices substantially impact the physical environment and human health. The study found that basic school pupils were aware of SWM practices as they were exposed and introduced early to class discussions and lessons. The second finding was that the pupils were very aware of SWM practices, and their effects on health and the environment were high. It also found out that selected schools used plastic waste bins as a collection and storage method of SW. The study revealed that SW in schools was disposed of in landfills and burnt. However, it was found that the environmental health effects of poor SWM practices were an outbreak of diseases like cholera, malaria, and diarrhoea, as well as air pollution. Also, it revealed that most pupils did not know whose responsibility it is to manage SW. According to Aforo's (2020) research, learners' adherence to appropriate and optimal SWM practices remained poor, even with increased understanding. According to the study, upper primary learners' syllable conversations and lessons included WM, whereas lower primary students did not. It was verified that the absence of appropriate and superior SWM resources and supplies impacts the commitment to waste management. The Dormaa Municipal Assembly should work with educational institutions and their authorities to create and implement periodic educational programmes to teach basic school students in the municipality about effective SWM practices, according to the Aforo (2020) study's recommendation.

Yeboah (2017) study in Ghana aimed to explore waste materials and turn them into teaching resources for art lessons. The study found out SW materials like paper, fabric, and plastic were available and could be recycled to create appropriate and useful instructional resources for practically teaching art lessons. It was found that the instructional resources were easy to use and work with because of their physical properties. These physical features to be considered when selecting instruction resources are attractiveness, durability, size, weight, easy handling, and storage (Yeboah 2017). The study revealed that waste material used in making the instructional resources did not pose any danger to the safety of participants and was a cheaper way of obtaining teaching resources. Yeboah (2017) study recommended that art teachers collect SW material and turn it into instructional resources for effective teaching of art, which will help the school learners understand what they are taught.

The scholars had different approaches to their studies. Hence, Aforo (2020) found out that learners were aware of SWM practices and recommended that more SWM education was needed in primary schools. Yeboah's (2017) study differs from Aforo's (2020) study in that SW was found to be a useful instructional resource when recycled, and it is recommended that teachers use SW as teaching resources. These two studies agree on the presence of SWM in primary schools.

2.6 LOCAL SCHOLARS' VIEWS

The researcher reviewed literature from South Africa on the following EE initiatives in primary schools in South Africa and initiatives contributed by Non-Governmental organizations (NGOs):

2.6.1 Solid Waste Management through EE initiatives in South African primary schools

The goal of Makhubele's (2017) study in South Africa was to assess primary school students' knowledge, attitudes, and actions with particular reference to SW recycling. The study's findings indicate that the students chosen for it were curious and worried about the condition of SW mismanagement in their communities and schools (Makhubele 2017; Njiva 2019). The majority of students could list or identify the components of SW at their schools, as well as the most likely sources of the SW stream and actions that may be taken to prevent or at least lessen the amount of SW produced. Reusing, burning, landfilling, and illegally dumping SW on public spaces like school grounds were reported to be the most popular methods of disposing of SW among primary school students (Makhubele 2017). On the other hand, unlawful disposal of SW and littering are the main obstacles to local authorities' ability to implement SWM effectively. It was evident from the amount of SW recycled by elementary school students in experiments conducted at different schools that the students chosen for this study were eager to participate fully in their school recycling programmes (Makhubele 2017; Njiva 2019). Thus, to minimize SW, environmental education should be promoted among learners in primary schools.

Makokotlela (2016) alluded that there is a huge difference between theory and practice concerning the implementation of EE. The government provides the legislative framework to guide schools. As an illustration, the National Curriculum Statement (NCSGr.R-12) incorporates EE principles. These principles apply to all Curriculum and Assessment Policy Statement for all subjects and are founded on social justice, a healthy environment, and human rights (DoBE 2011). The NCS Gr. R-12 has integrated EE in all subject policy documents (DoBE 2011). The integration is evidenced in the policy documents of all subjects, for example, Natural Sciences and Technology, Life Skills, and Social Sciences. All teachers teaching these subjects are expected to implement these initiatives as prescribed in the policy documents. The Mawela (2020) study indicates that this initiative has been more negatively impacted by the absence or inadequate execution of EE integration in the curriculum in South African primary schools. The following paragraphs will look at SWM initiatives recommended by scholars for implementation in primary schools:

2.6.2 Awareness through environmental campaigns at primary schools

In order to significantly lessen littering in communities, Mapotse and Mashiloane's (2017) study in South Africa sought to support the relevant stakeholders in incorporating environmental awareness activities into the elementary school curriculum. In this study, learners served as co-researchers and/or participants' observers, as well as pictures, were used to collect data. Learners consume daily different foodstuffs like fruit snacks, drinks, and fast food. Most foodstuffs are covered by plastic, promoting littering on the primary school grounds. The study's findings demonstrate that using action research in EE can help students become more conscious of littering (Nthalivi and Mswela 2016; Matsekoleng 2017). Also, the non-availability of environmental programmes for SW in primary schools is a reason for poor SWM (Nthalivi and Mswela 2016). The following initiatives were extracted from Mapotse and Mashiloane's (2017) study:

2.6.3 Collecting garbage from the primary school kitchen

Compost was made from vegetable SW and was used in the school garden. The co-researchers' actions in this activity were to make compost and produce manure for the primary school garden (Matsekoleng 2017). This activity raised awareness on how SW in the form of organic SW can be used in making compost. This means that one

of the three Rs, reducing organic SW, has been implemented to produce compost used in the school garden.

2.6.2 Preparation of the primary school garden from the SW dump site

The main schoolyard's waste site was transformed into a vegetable garden by the researchers and their co-researchers. Before cultivating, the soil was first softened and fertilized by burying garbage and decomposing matter. The exercise enhanced the co-researchers' understanding of SW and the environment. The environmental knowledge, attitudes, and behaviours of learners are positively impacted by outdoor SW teaching in the primary school garden (Nthalivi and Mswela 2016; Matsekoleng 2017). Co-researchers' attitudes were changed for this study, and they became eager to contribute to the vegetable garden's design and upkeep.

2.6.4 Picking up SW litter within the school

To maintain environmental responsibility and keep the ground tidy, co-researchers picked up SW that students left on the ground during breaks. This activity requires the collective actions of teachers and learners to see it successful (Nthalivi and Mswela 2016; Matsekoleng 2017). Poor SWM could be caused by a lack of discipline, respect, and negligence in primary schools (Mapotse and Mashiloane 2017).

The scholars Makhubele (2017) and Mapotse and Mashiloane (2017), agree that environmental programmes are key to the success of SWM in primary schools. Though the studies differ in their aims, the focus was on SWM in primary school, where lack of discipline, respect and negligence have been cited as a cause of poor SWM. In Makhubele's (2017) study, SWM methods used by primary schools are not environmentally friendly, like the burning of SW, landfilling, and illegal SW dumping on open spaces. Mapotse and Mashiloane (2017) study schools use environmentally friendly SWM methods like composting and picking up SW. This, therefore, means that the Department of Education, learners, and teachers are important in implementing EE initiatives in primary schools. Primary schools need to establish SW segregation and compost making areas and encourage awareness campaigns and talk shows on SW.

2.6.5 Non-Governmental Organisations of Environmental Education initiatives in primary schools in South Africa

EE initiatives in South Africa involve the government, NGOs, and schools. The NGOs include the Waste Wise School programme and IndaloYethu, etc. The Non-Governmental Organisations provide information and communication technologies for disseminating EE information, for example, books, pamphlets, CDs, DVDs, and websites (Thai, Rahm, and Coggburn 2017; Mawela 2020). This information also includes SWM. Makokotlela (2016) and Fredrick, Oonyu, and Sentongo (2018) pointed out the positive role played by NGOs through information and communication technologies as it has brought more public debate on environmental issues, produced excellent teaching resources through the internet and printed material available for free to schools. Through the above organisations, schools are expected to improve SWM. The NGO EE initiatives are as follows:

2.6.6 Waste Wise Schools' Programme in South African Primary Schools:

According to Green Times (2016) and Sikhosana (2022), the goals of the Waste Wise School programme in South Africa are to increase awareness among educational stakeholders, enable educators to raise awareness of the causes and effects of poor solid waste management and the advantages of integrated solid waste management and provide environmental equipment such as bin bags, rubber gloves, overalls, Newton meter scales, and recording sheets to improve the quality of life. Additionally, the programme aims to support primary schools with portfolio development and SW reduction projects. This will enhance the chances of improving SWM in primary schools. The first step to becoming a Waste Wise School is setting up a SWM committee inclusive of the school governing board, teachers, parents, learners, and the school cleaning staff. The second step is identifying the school's SW coordinator, who will head the solid waste management committee. The coordinator will be in charge of organizing, planning, and carrying out SWM in a school setting; promoting the school's SW minimization programme and outlining the crucial roles that each of the key players must play to ensure its success; training school staff and other interested parties in SWM; scheduling and presiding over regular meetings with the school SWM committee; keeping the school administration apprised; and generating awareness in the community, the media, and/or business to garner support or funding

for the initiative (Green Times 2016). The last step is a SW Audit: Learners and teachers can begin the SW audit now that your SWM committee has been created. A SW audit will help you figure out how much and what kind of garbage your primary school generates right now. This audit will tell you where your primary school generates SW (classrooms, cafeterias, playgrounds, etc.), what categories of garbage are generated, and how much SW is generated (Green Times, 2016).

According to the Green Times (2016), SW awareness is done at the grassroots; hence, the school and the community benefit from the SW management culture. The Green Times (2016) added that SWM was successfully implemented in the primary school curriculum. This, therefore, means that as the learners are taught about SWM at primary school by their teachers, the school and community gain proper SWM. Green Times (2016) pointed out that the programme is too involving; hence, some educators may not have enough time to apply all the programme requirements. Also, according to Sukma et al. (2020), teachers require appropriate training to enable effective guidance of learners.

The above initiatives directly involve the most important environmental players, which are the learners and the teachers. With all the information at their disposal, schools should consider talk shows, awareness campaigns, competitions, and debates on SW to improve SWM. Nthalivi and Mswela (2016) and Matsokelong (2017) also attest that poor management of SW in primary schools is the most noticeable environmental challenge as evidenced by items lying on the primary school grounds. This may be the case with the primary schools in the district.

2.6.7 IndaloYethu Projects in South African Primary Schools

IndaloYethu set up projects for Eco towns in King Sabata Dalindyebo Municipality and Mnquma Municipality in the Eastern Cape Province (Tholoana Consulting 2018). The main aim was to address environmental problems such as SW in towns and schools. Primary schools were provided with cleaning equipment, and dustbins, and were assisted in making gardens and composts, and undertaking awareness campaigns for SWM (Mabudafhasi 2010). It promoted sound SWM practices in primary schools and the 3Rs, reduces, re-use, and recycles (Mabudafhasi 2010). Through some initiatives listed above, primary schools should be able to get dustbins, recycling bins, and

compost areas and plan events on SWM. Learners' attitudes and perceptions would change due to the SW programmes set as they are more educative and empower learners. This study should also engage schools to open communication channels with Local municipalities and other schools to further SWM awareness.

The study by Nkalanga (2013) points out that the project for IndaloYethu had yielded successes, such as creating eco-towns, the cleaning and greening programme, youth energy savers, and eco-labelling. Through these programmes, youth employment was created (Nkalanga 2013). However, the contract was terminated abruptly due to the withdrawal of the core founders, WESSA, and the government, although many primary schools were in the middle of implementing recycling bins (SA News 2012). Several schools had subscribed to it. Nkalanga (2013) also added that IndaloYethu had the following failures: low human capacity in eco-towns, limited funding for some projects, and staff shortages due to fixed-term employment contracts. In this study, EE initiatives for SW were explored in three primary schools, how they were implemented, and how SWM could be improved to improve the primary school environment.

This study aims to fill the gap that is in existence concerning this topic. Most studies focus on secondary and university schools, and only a few focus on primary schools. There is also a huge gap in the literature regarding studies conducted in SA on the topic, as well as a lack of information on initiatives. In order to close this knowledge gap and constructively contribute to the body of current knowledge, this study has been undertaken.

2.5 CHAPTER SUMMARY

This chapter gave a detailed explanation of the literature from the contextual framework, which described the context of this study, which will focus on SWM initiatives in primary schools, followed by theoretical literature, which gave an overview of the WM theory underpinning this study. This chapter also gave a detailed analysis of the literature, which consisted of studies by different authors internationally, continentally, and locally on SWM in primary schools. As evidenced in the literature, many countries try their best to manage SW. However, much still needs to be done regarding awareness and implementing the SWM policies in primary schools. Chapter

three will outline in detail the methodology that this research will follow, including a thorough explanation of the research design, data collection methods, and ethical considerations.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The previous chapter examined contributions made in EE by other researchers in this field of study internationally, continentally, and locally. This chapter explains more about the research methodology that was used. The chapter then discusses qualitative research as a research approach to explore how the three primary schools around AED managed SW through EE initiatives. The case study research design was employed to take a qualitative approach to this research. The chapter discusses the population and sampling method that was used to achieve the aim and objectives of the study. This chapter deliberates on data collection, analysis and interpretation used in the study. Qualitative research data collection methods such as documentary analysis, interviews and observations were used to acquire data for this study. Also, it further discusses methods engaged to ensure trustworthiness and ethical issues to be followed during the study. The WMT mentioned in the preceding chapter was essential in determining the ideal research strategy for achieving the objectives.

3.2 RATIONALE FOR EMPIRICAL RESEARCH

The study was carried out in AED, one of the nine districts in the Eastern Cape Province. Eastern Cape has an approximate population of 7,500,000 people, and AED has approximately 900000 people (Municipalities 2020). There are approximately 5684 schools in the Eastern Cape (EC Education 2017). AED has 756 schools and approximately 669 primary schools. It is a very large district with many primary schools. No similar study has been conducted in AED, hence the necessity of this study to explore solid waste management through EE initiatives. Primary schools in the district draw their learners from both informal and formal residential areas, which makes it ideal for the study because of the difference in demographics. The research study's target is primary school learners and teachers. The primary school learners and teachers are the foundation for better implementation of SWM in primary school. The better the SWM in primary school, the better it will be for the community, as the young learners are the future of the community and the country. Learners and teachers in primary school were engaged in the research study practically through

awareness, recycling, reuse and reduction of solid waste in the primary schools. Raising awareness of the effects of SW and how to manage SW through primary school learners will send a strong voice to other primary schools to improve their SWM. The more primary schools benefit from SWM, the free the environment from SW.

As stated in Chapters 1 and 2, everyone has the right to live in a clean environment and to have it preserved for current and future generations by laws prohibiting pollution. This is stated in the RSA Constitution (1996). This study should assist primary schools in implementing the Constitution of the RSA through proper management of SW initiatives or activities. This study will be significant to the DoBE in assisting the teachers in the curriculum that envisages environmentally literate learners (DoBE 2011). For example, according to the DoBE (2011), Life Skills grade 5, Visual Arts: awareness and value of recycling emphasises that the learners should know what to recycle, how to recycle and why we recycle. Recycling is also taught in grade 4 and grade 6 as per the South African school curriculum (DoBE 2011). The result is that every child and teacher should take responsibility for their SW. This study should assist the teachers in bridging the gap between theory and practice as per the Constitution of the RSA and the CAPS.

3.3 RESEARCH METHODOLOGY

A study methodology is described by Babbie and Mouton (2015) as the plan that guides the selection and application of a particular approach using particular methods to gather and analyse data. Consequently, a researcher must thoroughly grasp the methodologies used when carrying out any research project (Welman, Kruger and Mitchell, 2013). Research methodology is also defined as a plan or framework that guides the researcher on how to gather, analyse and interpret the gathered data (Creswell 2017). From the above definitions from various researchers, this means that the research methodology is an outline used to respond to research questions. This research adopted a qualitative approach to respond to the research questions when collecting data as well as analysis and interpretation of collected data. Research design, research approach, and the paradigm within which the research is situated are all included in the field of research methodology. In order to place this specific study within the most appropriate paradigm, this section begins with a discussion of the

different paradigms. The research approach and design for this investigation are then discussed.

3.3.1 Research paradigm

A research paradigm is defined as a philosophical framework based on a research (Babbie and Mouton 2015). According to Babbie (2016), research paradigms are frameworks for observation and comprehension that influence what we observe and how we interpret it. Lincoln and Guba (2005) state that it provides a framework of assumptions and knowledge based on a study's ideas and methods. According to Rehman and Alhathi (2016), a research paradigm is a theoretical framework and fundamental belief system that makes assumptions regarding ontology, epistemology, methodology, and axiology. This means that it is our way of understanding and studying the world's reality. A paradigm is made up of the following: research methodology, or how we go about finding the answer or reality; axiology, or the ethical issues of research; ontology, or the nature of our beliefs about reality; and epistemology, or the branch of philosophy that is concerned with the nature and forms of knowledge, how it can be acquired and communicated to human beings (Lincoln and Guba 2005); (Rehman and Alhathi 2016). Common examples of paradigms are positivism, pragmatism, and constructivism, also known as interpretivism.

Interpretive research paradigm was used in this study. Interpretive paradigm is defined by Creswell (2017) as a paradigm concerned with understanding the world as it is from the subjective experiences of individuals. Lincoln and Guba (2005) defined interpretive paradigm as a paradigm with a main focus to understanding the subjective world of human experience. Based on scholars Creswell (2017) and Lincoln and Guba (2005), the interpretive paradigm relies on the subjective relationship between the researcher and subjects. This paradigm aims to understand people as they interact concerning solid waste within the school setting (Babbie and Mouton 2015). Reality is socially constructed, and importance is placed on understanding the individual and their interpretation of the world around them (Kivunja and Kuyini 2017). Before selecting a paradigm for research, researchers must have a thorough understanding of the presumptions, beliefs, conventions, and values of the paradigm, as these provide direction to the study (Kivunja and Kuyini 2017). This suggests that researchers should

select paradigms that make sense for their work while considering how well they will work with a given research design.

Kivunja and Kuyini (2017) indicated that an interpretive paradigm has the following assumptions: a subjectivist epistemology, a relativist ontology, a naturalist methodology, and a balanced axiology. According to subjectivist epistemology, the researcher interprets the data by thinking for themselves and cognitively processing it in light of their interactions with participants. According to a relativist ontology, the situation under study is subject to many realities that can be examined, given significance, or somehow reconstituted by interactions between the research participants and the research subjects. Using a naturalism methodology, the researcher acts as a participant observer and uses information from conversations, text messages, interviews, and reflecting sessions. A balanced axiology assumes that the research's conclusions will reflect the researcher's values to provide an accurate explanation of the findings (Babbie and Mouton 2015; Gemma 2018; Pham 2018). The interaction between the participants and their environment regarding solid waste creates this reality mentioned above. In this study, the interpretive paradigm assisted with the interpretation of data collected from semi-structured teacher interviews, observation of learners, and document analysis to understand how SW is managed in primary schools.

The advantage of using the paradigm in this study was that the researcher gained a deeper understanding of people in a social context (Gemma 2018; Pham 2018). Using this paradigm, the researcher will gain knowledge and understanding through interpretation of all events and experiences when studying solid waste management in primary schools. When interviewing participants, researchers may investigate and trigger what we cannot observe (Gemma 2018; Pham 2018). In this way, the valuable data collected in the three primary schools of AED provided the researcher with better insights for data analysis, findings in chapter 4 and recommendations in chapter 5.

3.3.2 Research approach

The research approach is described by Creswell (2017) as a method and procedure for conducting research that includes a range of assumptions and thorough approaches to data gathering, analysis, and interpretation. Research methodology is

the researcher's general method of carrying out research (Babbie and Mouton 2015). Choosing a research design involves considering the type of research topic or issue being addressed, the target audiences for the study, and the experiences of the researchers themselves (Creswell 2017). This emphasizes that, depending on the research problem, the researcher must make an informed decision on the study approach. The types of research approaches are quantitative and qualitative (Kothari 2014). However, Creswell (2017) mentioned the third method, the mixed method approach. It is a mixture of quantitative and qualitative approaches. The differences are explained as follows by Creswell (2017):

The quantitative research approach is a means of testing objective hypotheses by examining the relationship between variables. These variables can be measured frequently with the aid of devices to allow for statistical analysis of numbered data. The final written report follows a predetermined format that includes an introduction, literature and theory review, methodology, findings, and commentary. Those who employ this style of study, like qualitative researchers, make assumptions about their capacity to generalize and replicate the findings, account for competing hypotheses, incorporate bias protections, and test theories deductively.

A mixed research approach is a type of research technique that integrates or connects qualitative and quantitative modes of investigation. It involves employing qualitative and quantitative methodologies, merging the two approaches into a single study, and making philosophical assumptions. As a result, to make a study's total strength better than that of either qualitative research or quantitative research, it needs more than just collecting and analysing both forms of data; it also entails employing both approaches concurrently.

The qualitative research approach makes it feasible to look into and understand the meaning people or groups give to a social or human issue. The research process includes data analysis, interpretation, emergent questions and procedures, and an inductive progression from particular to broad ideas. Participant settings are frequently used to collect data. The format of the final report is flexible. Individuals who conduct this kind of research support an inductive approach to research, a focus on personal meaning, and the importance of authentically portraying the complexity of a situation.

This study used qualitative research methodology since the study requires interaction between the people and the environment (Creswell 2017). A qualitative approach to research is one that, according to Khothari (2014), is concerned with the subjective evaluation of attitudes, views, and behaviour. In such a setting, research is a function of the researcher's perceptions and insights (Khothari 2014). Qualitative research involves sustained contact with participants in their natural setting. This is essential because it increases the researcher's comprehension of the respondents' world (Neuman 2020). The qualitative research method collects and analyses non-numeric data (text, video, audio, etc.) to understand concepts, opinions, or experiences (Bhandari 2020). Researchers can use it to gain a deeper understanding of the problem or create new ideas for their research (Hennink et al. 2020).

It's a method focused on getting data through open and relaxed communication. The qualitative research method allows researchers to investigate and ask detailed questions based on the participant's answers. Researchers also try to understand the motives and emotions of the respondents (Creswell 2017; Bhandari 2020; Hennink et al. 2020). Understanding how the audience makes decisions can help conclude the study (Hennink et al. 2020). This was consistent with the study's goals and objectives. This study typically tried to preserve participants' voices and perspectives, and it could be altered when new research questions developed (Bhandari 2020). For this study, no new research questions were developed; hence, the voice and viewpoint of the participants was preserved. Qualitative research provides flexibility because the data collecting and analysis method can be modified when new ideas or trends arise. The benefit of qualitative research in this study was that data was collected in a real-world setting (Creswell 2017; Bhandari 2020; Hennink et al. 2020). The data in this study was collected in three real-world settings in the form of primary schools in AED. Detailed descriptions of learners' and teachers' experiences, feelings, and perceptions were also useful in building, testing, or enhancing systems in this study (Creswell 2017; Bhandari 2020). The teachers' experiences through the implementation of EE initiatives in primary schools were useful in data analysis.

3.3.3 Research design

Babbie and Mouton (2015) describe research design as a plan or blueprint for conducting research, while Welman et al. (2013) described it as the overall plan where respondents and means of data collection of a proposed study are selected. Research designs for qualitative, quantitative, or mixed methodologies, known as strategies of inquiry, give detailed instructions for the steps in a research design (Creswell 2017). Each qualitative research design adheres to a technique that matches the design (Khothari 2014; Creswell 2017). There are various study designs for qualitative research, just like there are for quantitative research, according to Creswell (2017). These include critical studies, phenomenology, case studies, grounded theory, ethnography, the study of cultures or social systems, and studies of a single entity and the meanings of lived experiences. The researcher has to select a design that is appropriate for the research topic and theoretical framework, as well as to take into account how to gather the necessary data to address the research question.

A case study is an investigation of a limited system, such as an activity, an event, a process, or individuals, based on broad data collection in a community (Msezane 2016). The research adopted a case study research design. According to Yin (2017), a case study is an empirical investigation examining a case or cases by addressing the how and why questions related to the phenomenon of interest. A qualitative case study examines the uniqueness and complexity of a single case in order to comprehend its behaviour within significant conditions (Stake 1995). It is a comprehensive, in-depth description and analysis of a bounded phenomenon, such as a plan, an organization, a person, a procedure, or a social unit, according to Merriam's (1998) definition of a qualitative case study. From the definitions above, it can be seen that case studies have similar characteristics, such as involving an examination of a phenomenon, addressing a case or cases, and the depth of the case or cases depends on the phenomenon being examined (Merriam 1998; Msezane 2016; Stake 1995; Yin 2017). According to Yin (2017), the case study method is effective in research because it uses direct observation of events being studied and interviews of the persons involved in the study, as well as its ability to deal with a full variety of evidence. The study gave a detailed account of three cases of primary schools in AED. The single-case study and the multiple-case study are the two case study options. According to Yin (2017), a single case study can be used to study and

understand an unusual case, a critical case, a longitudinal case, or a revelatory case, while a multiple-case study, on the other hand, examines the same phenomenon using two or more cases or replications across the cases. The research design separates single-case studies from multiple-case studies, but both fall under the same methodological umbrella (Yin 2017).

This study used multiple case studies because there were three different cases or schools to be explored: one in the industrial area, surrounded by informal settlements, one in the town centre and one out of town on a farm. The cases are located in different areas but are still in the AED and easily accessible. According to Yin (2017), multiple-case studies involve two or more cases or replications between the cases to look into the same phenomenon. This means that multiple case study is ideal for this study, as initially stated at the beginning of the paragraph. The multiple-case study provides more convincing evidence when the study's goal is to compare and repeat the findings, and the study is therefore seen as being more robust than the single-case study (Yin 2017). To produce a multiple-case study, researchers must summarize each case, come to cross-case findings, and create a cross-case report (Yin 2017). Msezane (2016) postulated that a researcher can provide a full interpretation of one or more cases in case study research. In support of Yin (2017), Msezane (2016) and Gustafsson (2017) also added that when conducting multiple case studies, researchers will be able to understand differences and similarities between cases, as well as to analyse the data both within each situation and across situations. Multiple case studies allow for a broader exploration of research questions and theoretical evolution (Yin 2017; Gustafsson 2017). Using the case study method, the researcher understood the study in question as it reflects a real-life event involving learners, teachers and the environment in terms of their experience in managing SW. This research design was in line with the study's objective, which is to collect accurate information and seek trustworthy detailed observations (Creswell 2017).

3.4 RESEARCH METHODS

3.4.1 Population and sampling

3.4.1.1 Population

Babbie (2016) defined a population as all groups involved in activities being studied, whilst Mishra and Alok (2017) expressed it as every item involved in an investigation. Shukla (2020) agreed with Babbie (2016) definition that a population is a grouping of all the units that have the variable trait being studied and for which generalizations from the research can be made. Kothari (2014) also argued that a population is an area comprising the study's objects collectively. In this study, three cases were investigated, meaning that each case represents a single primary school. The population for this study is all the teachers and learners in the three primary schools in Amathole East District. In the intermediate phase, the population in each primary school is as follows: School A – six teachers and 95 learners; School B – four teachers and 50 learners; School B – six teachers and 145 learners. The intermediate phase was made up of grades four to six.

3.4.1.2 Sample

Ainsworth (2020) defined a sample as a special subset of a population that is perceived to create inferences about the nature of the total population itself. A sample is a portion of the population that accurately depicts it (Shukla 2020), whilst Khothari (2014) defined a sample as a constituent of a collective or totality, based on which a conclusion is drawn about the collective or totality. According to Cohen, Manion, and Morrison (2017), a sample is a smaller group or subset of a population. This means that a sample is derived from a population. According to Creswell (2017), sampling is the process of choosing a group of individuals, occasions, behaviours, or other elements to carry out research. Sampling is also defined by Khothari (2014) as the process of choosing a portion of an aggregate or totality based on a decision or inference about the aggregate or totality. In this study, sampling is selecting a small group of participants from a population for data collection. The sample size of all three cases comprised six teachers and fifteen learners: two teachers, one male and one female and five learners, three girls and two boys, from each of the three schools. This study used purposive sampling. The reason why the researcher used purposive sampling is that it is not time-consuming and reduces the chance of errors (Fitzpatrick

2022). Purposive or judgmental sampling is a non-probability sampling in which researchers rely on their own judgment when choosing members of the population to participate in their study (Foley 2018). Purposive sampling is the “deliberate choice of participants due to qualities they possess” (Etikan et al. 2016, p.1). The target population in this study was selected through purposive or judgment sampling representing males and females, as indicated above. Participants were chosen because they are in the intermediate phase, their ability to provide rich information that will answer research questions, and their keen interest in environmental issues. Foley (2018) stated the benefits of purposive sampling as more information can be squeezed out of the data collected, time and cost effective. Etikan et al. (2016) state that the researcher requires prior knowledge of the study to approach and choose eligible participants. The researcher chose participants who fit a particular profile (Foley 2018). Participants were chosen from the Intermediate Phase based on their ability to provide information that will answer research questions and their keen interest in environmental issues. Also, because of environmental education content in their curriculum, consideration was given to the teachers teaching any of the following subjects: Natural Sciences and Technology, Social Sciences, Life Skills and Maths.

3.4.2 Data collection

Young and Hren (2017) outlined approaches to data gathering in qualitative research as document analysis, interviews, focus group interviews, observation and textual data. This study focuses on participant observation, semi-structured interviews and document analysis. The researcher prepared the semi-structured interview questions, observation sheets and document analysis. Data was stored as hard copies and electronically on cell phones, digital cameras and laptops. Primary and secondary data sources were used. Creswell (2017) defined primary data sources as data collected directly from the people or setting under study. Secondary data sources are defined by Creswell (2017) as second-hand accounts of the people or settings written by others. Examples of primary data sources are interviews, surveys, fieldwork, diaries, personal letters, correspondence, manuscripts, transcriptions, and observation sheets, whilst secondary data sources are quoted material, textbooks, encyclopaedias, web pages, journals, blogs, prints, paintings or replicas of art objects (Cohen 2007). Cohen (2007) added that primary data can be collected through interviews, observations and questionnaires. In this study, the primary data was

collected through semi-structured interviews and participant observation. The secondary data was collected through documentary analysis of CAPS documents, classwork books of learners and textbooks. Semi-structured interviews, observations and documentary analysis were the data collection methods to obtain quality results in this study.

3.4.2.1 Interview

Pandey and Pandey (2015) and Hennik et al. (2020) defined an interview as a two-way method which permits a conversation of ideas and information, whilst Creswell (2017) defined an interview as a social interaction. The interview is a well-known way of collecting qualitative data since it utilises verbal communication. Respondents may be close to nearby and ready to partake (Griffiee 2018). Due to Covid-19, the researcher did not interview learners but focused on teachers. There are various types of interviews, namely focus groups, structured interviews, telephone interviews and semi-structured interviews (Creswell 2017). This study used semi-structured interviews as a data collection method. The researcher came up with a list of questions and could also ask follow-up questions for participants to provide accurate information. In semi-structured interview, questions are predetermined, but the interviewer can ask for clarification (Griffiee 2018). A semi-structured interview schedule with questions was prepared. The researcher utilised a recording device to record interviews with teachers. Semi-structured interviews were utilised in this study because they produce detailed, in-depth data, and where there is a trusting relationship between interviewer and respondent, it allows for personal or sensitive issues to be investigated (Makokotlela 2016). Interviews have limitations like respondents may not be able to state their opinion clearly, may not have desired information and may not be willing to discuss what they know (Griffiee 2018). Griffiee (2018) pointed out that an interview requires a high level of questioning skills and active interpretation.

According to section 28 of the Bill of Rights in the Constitution of South Africa, children under the age of 18 have rights of protection from maltreatment, neglect or abuse, and exploitation (South African Constitution 1996). The Bill further indicates that children have the right to care, love and respect. The researcher piloted the interview questions to one teacher per school from each of the three primary schools. The researcher

probed the participants to elicit information that would assist in answering the RQ. Three teachers were interviewed after editing the piloted questions.

3.4.2.2 Participant Observation

Observation involves collecting information without asking questions, allowing the observer to add judgment to the data (Ainsworth 2020). Pandey and Pandey (2015) defined an observation as a method of assessment in which activities are observed in a natural situation. The study used participant observation for data collection because it can determine the dynamics of a situation, which cannot be measured through other data collection techniques like interviews and document review (Ainsworth 2020). The researcher used a camera to take pictures of SWM initiatives at the three primary schools. As the researcher interacted with learners and teachers, observations were made in the process, and learners and teachers took notes on the SWM initiatives during class and break time. The SWM initiatives showed actions and how the participants deal with solid waste in class and out-of-class situations.

There are two types of observation methods, namely participant and non-participant observation. The difference between these two types depends on the researcher's participation or non-participation in the life of the group he is observing (Khothari 2014). When the researcher observes as a distant observer without attempting to experience what others are feeling through participation, observation of this kind is often referred to as non-participant observation, as explained by Khothari (2014). However, the researcher observes by making himself more or less a member of the group he is observing so that he can experience what the group members are experiencing, the observation is called participant observation (Khothari 2014). In this study, the researcher observed the group as a participant observer. Participant observation offers the researcher a greater understanding of what is being studied, though it can change the behaviour of the other participants (Ferguson 2018). As a participant observer in this study, the researcher actively participated in the SWM activities with the learners indoors and outdoors. The activities included picking up papers, emptying packets of chips and plastics during break and putting them in the bins, sorting plastics, papers, soft drink cans and fruit peels from the bins and storing them in plastic bins, collecting and storing in plastic refuse bins, plastics and soft drink cans for local recyclers, taking leftover food and fruits peels to the biogas tank, carrying

sweepings grass and dry leaves from the school yard to the compost area for making compost layers, and making NS and LS grade 6 projects instruments like guitars, drums, electric circuits from boxes, tins and plastic bottles. The researcher was actively involved in all class and outdoor SWM activities, and notes were made. The researcher observed primary school learners' and teachers' SWM activities from three different schools during break time and lessons. The break time was used because participants could interact with the environment and themselves. COVID-19 restrictions were observed as stated by the DoBE (2020) Standard Operating Procedures (SOP) of 2020. The DoBE SOP of 2020 states that no visitors are allowed at schools unless it is very important; signing a register on entry, wearing masks, sanitizing hands and observing social distancing are important to anyone visiting a school. Lesson observations were used to check what happens in the classroom regarding curriculum delivery on SWM.

3.4.2.3 Document analysis

Document analysis is defined by Bowen (2009) as a systematic approach to studying or assessing written materials in both hardcopy and softcopy formats, while Wach (2018) defined it as a research technique for carefully and critically analysing written documents' contents. Data must be examined and interpreted to bring about meaning, increase understanding and improve empirical knowledge. The study used document analysis in combination with interviews and participant observation as a means of triangulation. Triangulation is a combination of methodologies in the study of the same phenomenon. Triangulation aids the researcher in safeguarding against the accusation that a study's findings are just a product of a single method, causing investigator bias (Bowen 2009). By triangulating data, the researcher attempts to make available evidence that raises credibility (Bowen 2009). During the document analysis, the researcher used the learners' class workbooks through the teachers. Learners' books, textbooks, Curriculum and Assessment Policy Statement (CAPS) documents and the South African Constitution were used in this study to explore how EE initiatives are implemented in the classroom.

3.4.3 Data analysis and interpretation

Data analysis brings order, structure and meaning to the collected data (Creswell 2017). Chapman (2018) defined data analysis as the range of processes and

procedures whereby we move from the qualitative data that have been collected into some form of explanation, understanding and interpretation of people and situations we are investigating. Analysing data involves examining qualitative data's symbolic and meaningful content, which is grounded in an interpretive philosophy (Chapman 2018). Analysing documents includes coding content into themes, and a rubric may be used to mark a document (Bowen 2009). Bowen (2009) outlined the following three primary types of documents: public records, personal documents and physical evidence.

This study used thematic analysis to analyse qualitative data collected through semi-structured interviews, participant observation and document analysis. Thematic analysis, according to Caulfield (2022), is a technique for analysing qualitative data in which the researcher carefully looks through the data to find recurring themes, concepts, and patterns of meaning. The acquired qualitative data was analysed using an inductive technique. Using an inductive approach means letting your themes emerge from the data (Caulfield 2022). Thematic analysis is usually applied to texts, such as an interview or transcript (Nieuwenhuis 2016). Caulfield (2022) stated that thematic analysis allows you a lot of flexibility in interpreting the data and allows you to approach large data sets more easily by sorting them into broad themes. However, it also involves the risk of missing nuances in the data. Thematic analysis is often subjective and relies on the researcher's judgement, so you must reflect carefully on your choices and interpretations (Caulfield 2022). The six steps of thematic analysis are familiarization, coding, producing themes, reviewing themes, defining and labelling themes, and writing up (Nieuwenhuis, 2016; Caulfield, 2022). Using this procedure may also help ensure that your analysis is free of confirmation bias.

3.4.4 Measures of Trustworthiness

According to Korstjens and Moser (2018), any research must adhere to standards that serve as benchmarks for assessing the validity of the findings. One way to frame these canons is as questions that need to be answered by all research. One could consider Korstjens and Moser's (2018) canons to be a seminal contribution to qualitative research technique. The four were established as conformability, credibility, dependability, and transferability by Korstjens and Moser (2018) and Lincoln and Guba

(1985). These inquiries are meant to determine the study's truth value, application, consistency, and impartiality, according to Korstjens and Moser (2018).

The canons are explained below:

Credibility was defined by Lincoln and Guba (1985) as the degree of certainty regarding the accuracy of the research findings. According to Lincoln and Guba (1985), credibility assesses whether the research findings are a legitimate interpretation of the participants' initial perspectives and constitute believable information drawn from the participants' original data. Guba (2012) and Lincoln and Guba (1985) assert that adopting well-established research methodologies, a design suited to the research question, and a theoretical framework, provides a platform for the research questions and methodologies to fit in are necessary steps to achieving credibility. For this study, acceptable techniques for participant selection, data collecting, and data analysis were picked. In order to choose participants for the semi-structured interview, a purposeful sampling method was used to identify those who were thought to be qualified to offer information that would help resolve the study concerns. In order to enhance the trustworthiness of data gathered during document analysis, participant observation was also used. The data collected for this study was thematically analysed as the study was qualitative.

Conformability was defined by Lincoln and Guba (1985) as the procedures to ensure that participant and/or researcher bias did not affect the data and findings. The validity of qualitative data is ensured when information is double-checked throughout data collection and processing to ensure that findings are likely to be repeatable by others (Guba 2012). Documentation could take the form of a detailed coding scheme that lists the codes and patterns discovered during the investigation. The degree to which the researcher maintains objectivity in light of the research findings is called conformability (Korstjens & Moser 2018). In other words, the extent of the researcher's and the respondents' involvement in the study's findings determines how much the researcher's prejudice and personal interests are controlled. In light of this, it was made sure that three separate data collection methods were employed: document analysis, participant observation and semi-structured interviews. This was done to lessen researcher bias and prevent issues arising when a study relies solely on one source of data. It was also ensured that the researcher had little direct contact with the research participants. This study ensured trustworthiness by performing a data audit

on decisions made and steps taken during the study before analysis to eliminate bias (Lincoln and Guba 1985).

In order to enable the study to be repeated, dependability is defined as a thorough explanation of the technique and design (Lincoln and Guba 1985). The dependability of the qualitative data is demonstrated by assuring that the conclusions were obtained despite modifications to the study location or participants during the data collection process (Guba 2012; Lincoln and Guba 1985). Again, meticulous procedures and techniques for gathering data help ensure that the final data set is reliable. Dependability was also considered to ensure that other researchers may use the study's findings as a reference. Dependability in this study was demonstrated by effective management of the research design, data collection, and analysis (Korstjens & Moser 2018). As a result, it was ensured that the files with the notes made during the interviews and observations, as well as data analysis and interpretation, were stored carefully for future use.

The transferability of qualitative data ensures that the study's results apply to people or similar situations (Lincoln and Guba 1985). It is possible to demonstrate transferability by making explicit assumptions and drawing relevant conclusions about the research site and participants (Korstjens & Moser 2018). Transferability was also considered while analysing the qualitative data to see if the results might be applied to bigger or other groups. This was done considering how typical the respondents were for the context being investigated and how to apply the findings to the study's context (Korstjens & Moser 2018). In the primary school intermediate phase, teachers were purposively sampled to confirm that the respondents were appropriate for this study. The study also took place in primary schools using CAPS as a curriculum, giving the subject under study an appropriate context.

The researcher used qualitative data collection procedures like document analysis, participant observation and semi-structured interviews to produce credible and dependable results. By analysing the evidence from the sources and applying it to create a clear justification for themes, combine information from several sources to create a triangulation of information (Creswell 2017). It might be argued that themes produced by integrating many data sources or participant perspectives will enhance

the study's validity (Creswell 2017). This was achieved through persistent observation and member check strategies. According to Korstjens and Moser (2018), persistent observation is determining which traits and components are most pertinent to the subject or topic you will be exploring extensively. Member check is defined as giving feedback data, interpretations and conclusions to participants from whom the data was originally collected (Korstjens and Moser 2018). This means that the researcher was constantly in touch with participants and reviewed the previously collected data through semi-structured interviews.

Rolfe (2004) states that a study is trustworthy if the reader judges it to be so. Thorne (2000, p.5) encourages researchers in qualitative research to “articulate their findings in such a way that the logical process by which they were developed are accessible to a critical reader, the relationship between the actual data and the conclusions about data is explicit, and the claims made concerning the data set are rendered credible and believable.” The researcher was open to the interviewees. Openness created a free and relaxing environment for the interviewees. Where trust is developed, the interviewees give reliable and accurate information. The researcher ensured trustworthiness by asking participants to review their data during data collection through member checking. By ensuring participants understood the purpose of the study, the researcher's approach to data collection, why he was there, and what he planned to do with the information, the researcher was able to assure credibility and trustworthiness in this investigation. The researcher developed a rapport based on trust with the participants through extended stays at the school. The same subjects were observed and questioned multiple times during this investigation to ensure consistency.

3.4.5 Ethical measures

Ethical measures involve much more than just following a set of standing guidelines, such as those provided by professional associations (Creswell 2017), whilst Bhandari (2020) defined them as a collection of principles that influence your research designs and methods. The ethical guidelines and norms developed by professional organisations that control academic research in many fields are known as codes of ethics (Creswell 2017). Scientists and researchers must always adhere to a certain code of conduct when collecting data from people. Understanding real-world

situations, researching efficient therapies, examining habits, and enhancing lives in other ways are frequently the objectives of human research. What you decide to research and how you conduct that research involve key ethical considerations such as protecting the rights of research participants, enhancing research validity, and maintaining scientific or academic integrity (Creswell 2017; Bhandari 2020). This study observed research ethics. The researcher applied and obtained ethical clearance from the University of South Africa Ethics Committee before commencing with data collection. Also, the researcher applied and obtained permission to conduct research from the Eastern Cape Provincial Education. Permission was sought from the Amathole East District through the District Director and 3 School principals. Since the learners were under the age of 18, first consent was requested from the parents by signing the parental consent forms. Learners signed assent forms after their parents had permitted them to participate in the study through consent forms. For participation in this study, teachers signed consent forms. In the observation process, the participants were mainly learners, while in the document analysis, interview, and observation process, the participants were mostly teachers.

A total of six teachers were interviewed, two from each school. The participating schools and teachers were given pseudonyms. Heaton (2021) defines a pseudonym as a false name of an individual or place used to disguise the identity of research participants. Pseudonyms were used in this study to protect the identities of participants and the primary schools. The researcher ensured that no participant was coerced. Participation was voluntary for all participants (Arifin 2018). Participants were informed of their rights to withdraw should they feel uncomfortable with the research. The researcher made sure to respect participants' integrity, dignity, culture, privacy, confidentiality, and rights (Arifin 2018). All answers given were not disclosed to anyone. In other words, participation was anonymous, and the information was kept confidential (Arifin 2018). In this study, to achieve transparency, the researcher was honest and open to all the participants at all stages of the research by clearly briefing them on the aims, implications, possible outcomes, and benefits of the research (Aguinis and Solarino 2019).

3.5 CHAPTER SUMMARY

This chapter dealt with the research design, methodology, and actions followed in conducting this study. The assessment of the methods used was also discussed. This study used the interpretive research paradigm because of its objective nature. The theory and practical evidence of SWM practices in primary schools in and around South Africa, provided in the previous chapters, informed the choice of suitable research methods to reach the study's objectives. This chapter discussed data collection methods, instruments and procedures used in conducting the study. All the responses were recorded for analysis in the next chapter. Based on the data found, textual and/or content analysis was used. The research methods given in detail in this chapter were also used to collect and analyse data, which will be further explained and confirmed in the following chapter, chapter four.

CHAPTER 4: DATA PRESENTATION, ANALYSIS, AND DISCUSSION OF FINDINGS

4.1 INTRODUCTION

The research methodology of this study was dealt with in the previous chapter. This chapter deals with the data presentation and analysis based on the research questions, as stated in Chapter 1. The collected data were, therefore, intended to answer the research questions.

This study used thematic analysis to analyse qualitative data gathered through semi-structured interviews, participant observation and document analysis. An inductive approach was used to analyse the qualitatively collected data, as Caulfield (2022) advised. Data analysis from semi semi-structured interviews was done continuously after each interview with participants from Alfa, Block and Camp primary schools to understand the EE initiatives used to manage SW. Participant observation data was always analysed after each observation of the EE initiatives used to manage SW at each primary school. Analysis of data from documents was done from the selected documents. The documents were read thoroughly and intensely to identify common words and patterns that came up repeatedly from the collected data. Data was coded, and similar codes were grouped. Specific quotations from the interviews which support the codes were highlighted. From similar codes, clusters were established, and then concepts were formed which guided the discussions of findings under each data collection method. Considering confidentiality issues concerning ethical procedures, the participating schools and teachers were given pseudonyms, as indicated in Chapter One.

WM theory by Eva Pongracz (2002) was used to explain the study's findings. The main aim of the theory was aligned with this study, that is, to minimize SW at source and prevent SW from causing harm to human health and the environment, whilst Maleka et al. (2017), through the adoption of WMT, emphasized the need for commitment from organisations to increase the proportion of non-waste living the process. Additionally, Pongracz and Pohjola (2004) mentioned that WMT is aimed at encouraging the conservation of resources by applying waste management and avoidance of resource

loss. Pongracz (2002), Pongracz and Pohjola (2004), Beleya et al. (2019), and Maleka et al. (2017) concur that the SW leaving the source must be reduced. Furthermore, Lagman-Bautista (2020) classified waste practices as waste prevention, recovery and treatment. Prevention practices such as strategies on waste minimization and end-of-pipe strategies include recovering the economic value of waste through waste separation, recycling, proper landfilling, incineration and environmental restoration practices intended to repair leakages and damages to the environment (Lagman-Bautista 2020). In this study, activities like SWM awareness, SWM events, and reducing, reusing and recycling SW were aligned with the WMT aim and practices. The following practical principles of WMT were also aligned with the study results, namely: explaining waste and concepts; providing a guide for choosing WM options; providing a framework for how and when to pick and integrate WM choices; forecasting the outcomes of the implementation of WM activities as previously introduced in chapter 2 (Pongracz 2002). Table 4.1 summarises the schools and teachers who participated in the study.

Table 4.1 Number of sampled schools and teachers who participated in a study

Participating Schools	Sampled teachers	Subjects taught	Number of sampled teachers per school
Alfa primary	Mr. Vanraj Ms. Anu	LS and SS (grade 4-6) NS (grade 4-6)	2
Block primary	Ms. Tall Mr. Vinraj	Maths and SS (grade 4-6) NS and English (grades 4-6)	2
Camp primary	Mr. Said Ms. Emlie	NS and SS (grades 4-6) LS and SS (grade 4-6)	2
TOTAL			6

The teachers who participated in the study were teaching the intermediate phase, grades four to six. They were teaching LS, SS, NST, English and Mathematics. The table showed that one female and one male teacher per school participated in the study.

The findings showed that EE initiatives were used to manage SW at the three primary schools. Table 4.2 presents a summary of such initiatives per method of data collection of the participating school.

Table 4.2 List of EE initiatives used to manage SW at primary schools

Data collection method	Alfa School EE initiatives	Block School EE initiatives	Camp School EE initiatives
Findings from Semi-structured Interview	<p>Provision of indoor and outdoor bins.</p> <p>Awareness of SWM activities at assembly by teachers.</p> <p>Burning of SW like papers and plastics.</p> <p>SWM events; market day by learners.</p>	<p>Provision of indoor and outdoor bins.</p> <p>Awareness of SWM activities at assembly by teachers.</p> <p>Burning of SW-like papers.</p> <p>Recycling of SW-like plastic.</p> <p>SWM events: Love your space; clean-up campaign.</p> <p>Other initiatives: Reduce SW: Biogas production using SW like vegetable peels. Compost making</p>	<p>Provision of indoor and outdoor bins.</p> <p>Awareness of SWM activities at assembly by teachers.</p> <p>Burning of SW like papers.</p> <p>Recycling of SW like plastic and soft drink cans.</p> <p>SWM events: Competitions by the Municipality; Yvonne English Festival; Clean up campaigns.</p> <p>Other initiatives: Reuse of SW such as of wooden pallets to make boundary wall.</p>
Participant observation	<p>Burning of SW like papers, boxes and plastics</p> <p>Recycling of SW, like plastic, paper, metal cans. making electrical circuits and musical instruments such as drums, guitar, and shakers</p>	<p>Reuse of SW like tins and garbage.</p> <p>Burning of SW like papers</p> <p>Recycling of SW, like plastic, paper, metal cans. making electrical circuits and musical instruments such as drums, guitar, and shakers</p> <p>Reducing SW, like biogas production and compost making</p>	<p>Burning of SW like papers</p> <p>Recycling of SW, like plastic, paper, metal cans. making electrical circuits and musical instruments such as drums, guitar, and shakers</p>
DOCUMENT ANALYSIS	<p>Recycling of SW.</p> <p>Making electrical circuits and musical instruments such as drums, guitars, and shakers</p>	<p>Recycling of SW.</p> <p>Making electrical circuits and musical instruments such as drums, guitars, and shakers</p>	<p>Recycling of SW.</p> <p>Making electrical circuits and musical instruments such as drums, guitars, and shakers</p>

4.2 FINDINGS AND DISCUSSIONS

This section discusses findings from the semi-structured interviews, participant observation and document analysis and the list of initiatives.

4.2.1 Findings from semi-structured interviews and discussions

4.2.1.1 Provision of bins

Results from semi-structured interviews revealed that Alfa, Block, and Camp primary schools provided indoor and outdoor bins for learners to throw SW like papers, plastics and fruit peels. The findings confirmed that the three primary schools had a bin in each classroom while the outdoor bins were put in every path and park of the school. The results concur with Ezati et al. (2017), who stated that one of the SWM initiatives was the distribution of SW disposal bins at primary schools. Additionally, the finding supported Syakura et al. (2017), who mentioned that non-availability of bins at primary schools contributed to poor SWM. Findings revealed that the waste thrown in the bins was mixed because there was no instruction to separate the waste according to paper, plastic, garbage, metal and bottles. At Alfa Primary School each class had a bin to throw SW and three big outdoor bins. When asked what SW examples are generated at the school, Mr Said had this to say:

Examples are plastic bottles, glasses, papers, plastics, fruit peels, food leftovers, batteries, bottles, and soft drink cans.

The types of SW found at Alfa primary were similar to those found at Block and Camp primary schools, which included papers, plastics, empty plastic packet from chips and plastic, fruit peels, food leftovers, plastic bottles and soft drink cans. Only the quantities differed. For instance, there were fewer plastic bottles and soft drink cans at Alfa and Block primary schools than at Camp primary school. Block and Camp primary schools also had classroom bins in each class, but the outdoor bins were more than 10 in each school. SW mentioned above that include papers, plastics, chips and sweet packets were thrown by learners in the classroom bins during lessons. When asked about the use of bins by learners as a SW initiative at the school, Mr Virat mentioned:

The learners throw litter into the classroom bins and outdoor bins.

Mr Said responded this way to the question above:

Learners throw papers in the classroom bins, and when full the prefects will empty the bins in the big bins outside.

This finding confirms the availability of bins at the three primary schools. The bins were available in the classrooms and the school's outdoor environment to enable SWM. At Camp, primary prefects took the full bins in their classrooms to the outdoor bins, where the SW was later packed into black plastic bins, ready for disposal, whilst at Block and Alfa, primary caretakers always checked for full bins in the classes. Results showed that all the three schools used plastic waste bins as a collection and storage method of SW. The finding was in line with that of Aforo (2020), who found that the plastic waste bins were used for SW collection and storage in the selected schools. The results concur with Pongracz's (2002) theory of WM practical principle of explaining waste and concepts as it enables learners to know and understand the meaning of SW, the type of SW found at their school and how it can be disposed of. The WM practice exhibited here is waste recovery, as Lagman-Bautista (2020) stipulated. Waste recovery refers to strategies that involve recovering economic value on SW through waste separation, recycling, proper landfilling and incineration. In this study, the availability of bins indoors and outdoors enabled SW separation. The provision of bins encourages learners to keep their school environment clean.

The three primary schools had a duty roster for monitoring picking up SW by learners during break time. The duty roster for teachers and prefects was developed by the school management team at Alfa and Block primary schools, whilst at Camp, it was done by the principal. The routine for the duty roster at Alfa Primary comprised three teachers and four prefects every day during break time. Two groups of teachers and two groups of prefects alternated on a weekly basis. At Alfa the initiative was started by the SMT, whilst at Block and Camp, it was from the principals. Each grade was allocated a day, for instance, grade 4 on Monday, grade 5 on Tuesday, grade 6A on Wednesday, and grade 6B on Thursday. Block primary used the same routine besides the number of teachers and learners. They had two teachers and two learners

monitoring during break time. Grades were allocated a day per week, and Friday was a special cleaning day for a specific grade allocated. At Camp Primary, two teachers and five prefects were monitoring learners per week, for example, grade 4 on Tuesday, grade 5 on Wednesday and grade 6 on Thursday. They were monitoring the picking of SW from the ground. All the teachers monitoring during break time were the first to leave the classes during break and the last to return. This was done to make sure that the teachers were visible. All the six teachers participating in this study were in either one of the monitoring groups. The monitoring was effectively done at Block and Camp primary rather than at Alfa primary as some monitors on duty were all available but not doing their work of ensuring that the school environment was clean from SW. The presence of the monitors during break time had a positive impact on the cleanliness of the school. This result aligns with the WMT practical principles of providing a guide for choosing WM options, providing a framework for how and when to pick and integrate WM choices and forecasting the outcomes of the implementation of WM activities (Pongracz 2002). It further aligns with scholars like Philips et al. (2002), Pongracz et al. (2004), and Beleyah et al. (2019), who argue that WMT aims to reduce SW at the source. Learners were encouraged to keep their school environment clean through monitoring by teachers through the duty roaster and the weekly picking of SW by the class.

Alfa, Block and Camp schools had also hired the services of caretakers, whose responsibilities were, among other duties, to pick up solid waste at the end of the break time and after school. The caretakers played an important role in the management of SW at the three primary schools, like collecting SW from the main bins in refuse bags to the waste storage centres before collection by Municipality trucks. Solid waste like papers, plastics, and leftover food was stored in black plastic bags and thrown in big bins awaiting collection by the municipality or burning. The caretakers were also responsible for cleaning classrooms and emptying classroom bins and outdoor bins in preparation for collection by the Municipality. This finding agrees with Syakura et al. (2020) that caretakers provided the service of handling SW at primary schools. The school classrooms and outdoors were clean due to sweeping SW, picking up SW, throwing SW in the bins, and proper and responsible use of bins by the learners. The employment of caretakers has improved SWM in all the primary schools. However,

this may cause learners in these schools to fail to be responsible for SW as there are people employed for that.

4.2.1.2 Awareness

The findings revealed that all the primary schools used awareness to teach the learners about SWM. The awareness was done in class and at the assembly by teachers on duty. Learners were reminded of SWM activities, such as the availability of bins and picking up SW, which were in the form of papers, plastics, chips and sweets, empty packets, plastic bottles, soft drink cans and fruit peels, and throwing them in the bins provided. At Alfa and Block primary assembly, this was done every day, and one teacher was on duty per week, while at Camp assembly, it was on Mondays, Wednesdays and Fridays. The teachers from the three schools have successfully embraced the awareness, and they also went the extra mile to remind learners in class. The constant reminders made the learners to be conscious of SW around them. The results revealed that teachers on duty in all the schools emphasized keeping the environment clean from the SW mentioned above. The awareness made by teachers at the three schools was effective because classrooms and outdoors were clean. When asked how the school manages SW, Ms Anu had this to say:

We encourage and remind learners at assembly lines to put solid waste like papers, plastic, empty packets of chips and fruit peels in the bin in classes or outside.

This means that teachers at the three primary schools encouraged learners to keep the school's indoor and outdoor environments clean from SW. These results concur with Aforo (2020) that learners were aware of SWM practices because they were exposed to and introduced early from grade four. This also concurs with Green Times (2016) when it mentioned that SW awareness was done at the grassroots for the benefit of the school and community. The finding agrees with Sanchez et al. (2019) that learners were aware of clean grounds and SWM programmes, while it contradicts Syakura et al. (2017), who said there was a lack of SW individual awareness in Indonesian schools. Alfa, Block and Camp primary schools had similar SWM awareness, and the principals who drove it. However, at Camp they were assisted by personnel from the Municipality who conducts competitions such as debate, drama, quiz, essay writing and public speaking at the district level. The municipality officials

normally conducted awareness for SWM when it was time for competitions around July and August every year at Camp Primary. The municipality and Camp primary worked together to put them in a stronger position to manage SW than the other two primary schools, which exclusively used their teachers to spread awareness. Learners and teachers at Block and Camp primary schools were happy and showed interest, whilst the teachers made announcements on SWM. However, there were a few learners at Alfa primary that showed some discontentment as they were grumbling during the time of announcements. A few learners showed signs of being bored by the reminders on SWM. Findings indicated that the sense of responsibility in managing SW increases as learners practice SWM activities at primary schools. This was confirmed by Lalamonan and Comighud (2020) and Sanchez et al. (2019), who stated that the level of awareness of SWM was high among learners. The finding contradicts Aforo (2021) finding that despite a high level of awareness, learners showed low levels of proper and best SWM practices. The SW is thrown in the bins in classes and outside all schools. Concerning WMT, this result is supported by the WMT practical principles of providing a guide for choosing WM options, providing a framework for how and when to pick and integrate WM choices and forecasting the outcomes of the implementation of WM activities (Pongracz 2002). Scholars like Philips et al. (2002), Pongracz et al. (2004), and Beleyah et al. (2019) argue that WMT aims to reduce SW at the source. This aligns with WMT's waste practice of minimising SW. In this study, SW is minimised through teachers' awareness of SWM at assembly (Langman-Bautista 2020). The teachers provided guidance regularly in class and assembly. The teachers also provided the learners with the SWM options to keep their school environment clean and SW-free.

The results showed that there was collective action between learners and teachers in the management of SW by picking up SW and disposing of it in the bins. The SW was picked and thrown in plastic refuse bags for storage, awaiting collection by Municipality trucks for disposal. This SW was later sorted into the garbage, which pig farmers took, and some were taken to a biogas tank for compost making. The paper was burnt, and plastic and soft drink cans were recycled. Paper burning and recycling will be discussed in the next paragraphs. Findings showed that learners at Block Primary School were managing SW effectively and had a sense of responsibility, as clean classrooms and clean school grounds evidenced this. This finding concurs with

Mapotse and Mashiloane (2017), who pointed out that teachers and learners should work together for SWM's success and use environmentally friendly SWM practices like picking up SW. This result agrees with Matsekoleng (2017) and Mapotse and Mashiloane (2017), who found that participants were involved in picking up SW to keep the ground clean and took charge of their environment because learners dropped SW on the ground during break, which made the ground untidy. On the other hand, Nthalivi and Mswela (2016), and Matsekoleng (2017) idea agree as they said SWM requires collective actions of teachers and learners to see it successful. These results align with the WMT practise of waste recovery as the learners pick up papers and plastics and throw them in the bins provided indoors and outdoors (Langman-Bautista 2020; Pongracz 2002).

4.2.1.3 Burning

Findings revealed that five out of six respondents from the three primary schools sent SW-like papers and plastics to illegal dumpsites for burning. The findings from Alfa primary showed that when the SW from the school bins reaches the SW centre at the school, they are packed into plastic refuse bags for storage before the municipality collects them on Thursdays. The caretakers are responsible for this daily. No sorting and separation was done. The SW was burnt if not collected by the municipality trucks to avoid the stench smell and breeding flies and rats.

Meanwhile, the findings at Block Primary revealed that when SW reached a SW centre at the school, the SW would be mixed and in refuse bags. The caretakers sort and separate SW at this SW centre. The papers and plastics were taken to a burning area and were burnt. At Camp Primary, SW is packed into refuse bags when it comes from bins. Papers were burnt at designated places. All three schools had a place where SW could be burnt. Each primary school has a SW centre where SW is stored and kept for collection or recycling. All three schools have illegal dumpsites within their premises. The findings further confirm the view of Makhubele (2017) that the most preferred option for disposing of SW amongst primary schools was found to be reuse, burning of SW, landfilling, and illegal dumping on open spaces like school grounds. However, Makhubele (2017) mentioned that burning SW is not environmentally friendly, stating that illegal dumpsites are a major factor hindering effective SWM. At Alfa, primary SW was sometimes collected by the local municipality. This result

concur with the WMT practical values of providing a guide for choosing WM options, providing a framework for how and when to pick and integrate WM choices and forecasting the outcomes of the implementation of WM activities (Pongracz 2002). In addition, the finding aligns with WMT practices of SW treatment because SW, such as papers, were taken for burning by caretakers (Langman-Bautista 2020).

4.2.1.4 Recycling

The findings at Camp Primary showed that the school was recycling SW, like plastic and metal cans. A recycling company did the collection of SW like plastic and soft drink cans for further processing into usable products. The plastics and the soft drink were sorted and separated from the other SW and were packed in refuse bags. The plastics and the cans were stored inside a room selected for keeping SW before collection by the municipality or recyclers. According to Ms Emlie, learners were encouraged to bring bread plastics for a price of two rands per full plastic carrier bag, the medium size one that grocery shops normally give, and the school also received posters for waste management. Filling a plastic carrier was a challenge as not all the learners could meet the target. Many ended up joining forces to fill the bags. Any other sorted plastics from the school bins were packed differently for collection by the recycling company. Also, the sorted cans were collected by local waste pickers free of charge. The local waste pickers visited the school once per week to collect the cans. If the cans were not separated from the other SW, they would separate them independently. Learners were interested in the collection of plastics as there was a reward, though it was little. The reward encouraged good practice in SWM as the school and community benefited from a clean environment. The findings agree with Matsumoto and Saizen's (2017) study that students, teachers, and parents in schools with EC were allowed to practice SW segregation and the economic benefits realized from selling recycled SW. The study results support Ezati et al. (2017) that recycling is also an option for dealing with SW at school, where selected SW will be used to make other products.

On the other hand, the findings support Makhubele (2017), who pointed out that learners were willing to become actively involved in their school recycling schemes. This confirms that the school improvised to make recycling a success regardless of not having enough resources, like recycling bins, for the recycling process. Also, the results concur with DoBE (2011) CAPS that support SWM through the topics in some

subjects in grade 6, such as NST, LS, and SS, where learners were required to perform recycling. Examples of topics in grade 6 NST are Electrical circuits, where learners were requested to make an electrical circuit using recyclable SW material. In grade 6 LS, the example of the topic is Create in 3D and Create and Improve. Learners in grade 6 LS were requested to make musical equipment using recyclable SW material. In grade 6 SS, the example of the topic is what people trade. In SS grade 6, learners learnt about raw materials used to make products, in this case, SW, that can be recycled to make other usable products. The three schools practised recycling, although it showed that they had limited knowledge of how to do it and lack of resources like recycling bins. If the two schools can access the little information that Camp Primary is having, they may practice recycling. Camp primary did not have the resources such as recycling bins during the study, but they improvised using plastic bins. With more information and more resources, they would be able to effectively implement recycling.

At Camp Primary, results also revealed that the school recycled SW, such as wooden pallets, to make a boundary wall. At Camp Primary, the boundary wall of the play centre for pre-schoolers was made of wood from old wooden pallets obtained from deliveries of stationery at the school and was constructed by one of the teachers and some learners. The wooden pallets were broken down into single and usable planks of wood. The teacher also used nails from the pallets to join the wood to make the boundary wooden wall for the play centre. The wall was painted after completion. Recycling is a better SWM practice than burning and illegal dumping of SW. The following is a response from Ms Emlie when asked what EE initiatives the school employed to address solid waste:

A teacher constructed a boundary for preschool play centre with wood from wooden pallets and painted it beautifully.

The finding agrees with Kandole (2021), who mentioned that learners made their own SW bins using SW-like plastic bottles. This initiative confirms that the school is recycling SW to make other useful products as a beautiful boundary fence.

Findings from Alfa, Block and Camp primary showed recycling of SW in the form of plastics, tins, boxes and wood was done to make NST and LS projects for grade 6

learners such as electrical circuits and musical instruments like guitars, drums and shakers. These instruments were safe to use and cheap to make. The results showed that no learner was injured whilst making the resources, which concurs with Yeboah (2017), who pointed out that SW used did not pose any danger to the learners' safety and was a cheaper way of obtaining teaching resources. When asked about what SW initiatives are being implemented at the school through learning in the classroom, Mr Virat responded this way:

Learners are given projects in form of formal assessment of making musical instruments like drums and guitars with tins and plastics. They also make electrical circuits with cardboard boxes. This SW is available within the school in the bins.

The use of SW within the school has made it possible for learners to practically do their tasks at school without wasting time to fetch resources required elsewhere. This finding supports Yeboah (2017) that teachers can collect SW material and turn it into instructional resources for effective teaching, which will help the school learners understand what they are taught. It was important to use SW material in making instructional resources as the SW material mentioned above was available and easy to use. Mr Said had this to say:

The solid waste used to make project was easily available and safe to use.

This result is supported by WMT's practical principles of providing a guide for choosing WM options, providing a framework for how and when to pick and integrate WM choices and forecasting the outcomes of the implementation of WM activities (Pongracz 2002). The recycling of SW, such as plastics, tins, boxes and wood, was done to make NST and LS projects for grade 6 learners, such as electrical circuits and musical instruments like guitars, drums and shakers. SW recovery was revealed in this study through recycling activities in the three schools (Pongracz 2002; Lagman-Bautista 2020).

4.2.1.5 Events

The findings revealed that learners at Alfa conducted a market day, where they made and sold products such as paper dolls and sock dolls and toys from recycled SW like plastic, plastic bottles, tins and wood. At Block Primary, they held SWM events like Love Your Space, a clean-up campaign to keep the school clean and teach learners how to manage SWM. At Block Primary, they launched a 'Love your space' campaign meant for learners to keep their space SW free. Also, some of the events at Block Primary included a clean-up campaign involving the whole school in picking up litter and racking grass and leaves. These events at Block Primary assisted in managing SW as the learners keep the school clean. All three participating primary schools had SWM events that also managed SW while educating learners about SW.

Camp primary worked with the municipality in the management of SW, and there was a board from the municipality confirming the existence of a partnership between the school and municipality for SWM. Also revealed at Camp Primary was that the school had SWM events to improve the management of SW, such as competitions by the Municipality, Yvonne English Festival and clean-up campaigns. Camp Primary School received awards from the Municipality competition on SWM. When asked if there any school events that support solid waste, Ms Anu said:

The learners have a market day, where they make and sale products, such as toys such as sock dolls, paper dolls, paper balls, plastic balls, and cars made from SW like boxes, paper, plastics, wires and plastic bottles.

Mr Virat had this to say:

Yes they are school events. Launch of 'love your space campaign meant for learners to keep their space clean. Also, a clean-up campaign involving the whole school in picking up litter and racking grass and leaves.

Ms Emlie said:

We have events like Yvonne English festival, cleaning up campaign of the school, and town, and solid waste management. Competitions sponsored by the Municipality.

The above quotes confirm the availability of different SWM events at the three primary schools. All three schools had different SWM events. Block and Camp primary had more events than Alfa primary. It shows that learners were engaged practically in SWM activities. With competitions in place, learners realised the benefits of their hard work in SWM. Concerning Pongracz's (2002) WMT, the implementation of the SWM events at primary school concurs with the WMT practical principles of providing a guide for choosing WM options, providing a framework for how and when to pick and integrate WM choices and forecasting the outcomes of the implementation of WM activities (Pongracz 2002). Scholars like Philips et al. (2002), Pongracz et al. (2004), and Beleyah et al. (2019) argue that WMT aims to reduce S W at the source. This showed that SW prevention and minimisation took place in the three schools using SW events and competitions mentioned above.

4.2.1.6 Reuse

The findings at Block Primary revealed that SW in the form of big tins used for packaging fruit salads and jam were reused for baking steam bread in the school kitchen. This is one way to reuse SW material and clean the school environment. The tins were cleaned and kept in the kitchen storeroom after removing the contents. They were used only when the steam bread was made and stored again after use. This was a cheaper way of producing bread in large quantities. This method saves the school money spent on buying bread from the shops and baking using baking trays. Other findings at Block Primary showed local pig farmers collected the remainder of fruit peels and vegetable peels for feeding their pigs. The school allowed the local farmers to collect this type of SW at no cost. However, they were not taking much on the collection day because the same SW was used for biogas production. The pig farmers also had access to vegetable leaves from the school garden. These findings confirm that the reuse of SW was practised as an initiative to manage SW at the primary school. These two initiatives were only at Block primary and were not found at Alfa and Camp primary. The results agree with Makhubele (2017) that reusing SW for another purpose was a way of disposing of SW. Reusing is a better SWM practice than burning and illegal dumping of SW. The results support Ezati et al. (2017), who found out that after the reuse of SW by learners, there was a noticeable change in behaviour in handling SW. This result concurs with the WMT practical principles of providing a guide for choosing WM options, providing a framework for how and when

to pick and integrate WM choices and forecasting the outcomes of the implementation of WM activities (Pongracz 2002). SW recovery was done through the reuse of SW, such as using tins to make bread and using left-over food by pig farmers to feed pigs (Lagman-Bautista 2020). Furthermore, Pongracz and Pohjola (2004) mentioned that WMT is aimed at encouraging the conservation of resources by applying waste management and avoidance of resource loss. The tins were conserved for further use as baking tins for steam bread and were not thrown away.

4.2.1.7 Reduce

4.2.1.7.1 Biogas production

At Block Primary, it was revealed that the school practices reduced SW through the biogas production plant using SW, like vegetable and fruit peels, to produce gas for cooking in the school kitchen. This was not revealed in any literature. Semi-structured interviews revealed that Block primary, as a boarding facility, has a biogas plant for the generation of gas, for cooking in their school canteen. The biogas system uses SW such as garbage like leftover food, rotten vegetables or fruit, and peels from fruits and vegetables. The biogas system comprises two underground tanks; inputs sink for putting the items in the tank, pipes, and a gas stove. When asked about what SW initiatives are being implemented at the school, Mr Virat responded this way:

The school has a biogas tank next to the canteen. Garbage made up of vegetable and fruit peels are thrown in the tank for production of gas used for cooking.

This is an important initiative, especially these days when there is load shedding. The school would be able to cook for their learners, and it is a cheap energy source as it is produced naturally at the school.

4.2.1.7.2 Compost making

At Block Primary School, the learners and caretakers reduced SW by making compost for the school garden. The compost was made of cut dry grass and tree leaves swept from the premises. The result concurs with the findings of Matsekoleng (2017), who states that compost was made from vegetable SW and produced manure for the primary school garden. The finding further concurs with Nthalivi and Mswela (2016) as well as Matsekoleng (2017), who found that school gardens had a positive impact on

learners' environmental knowledge, attitude, and behaviours, especially when making compost with SW like cut grass and dry leaves. At Camp Primary School compost made assisted in reducing SW like dry grass, tree leaves and vegetable leaves, and the cost of buying fertilizers to use in the school garden. This is aligned with Matsekoleng's (2017) point that compost was made and manure was produced for the primary school. The findings further concurred with Matsumoto and Saizen (2017), who mentioned that schools should reduce SW by making compost for their gardens. Block primary had a big garden with vegetables like cabbages, onions, and spinach. When asked about what SW initiatives are being implemented at the school, Mr Virat had this to say:

Grass cut from the school environment and sweepings of leaves are sent to the school garden as mulching and making of a compost by learners.

The result of the study is in line with Nthalivi and Mswela's (2016) and Matsekoleng's (2017) ideas that the learners were involved practically in managing SW by assisting the gardening staff by bringing swept grass and leaves to the compost area to compost layers. However, more needs to be done for the learners to start learning more gardening skills, such as mulching, that is, putting dry grass and leaves on top of the soil to prevent evaporation, because this will help them even at their homes as they will realise that mulching can save water. The findings concurred with Kandole (2021) and Ezati et al. (2017), who found that primary schools play a key role in reducing SW so that children learn and transfer knowledge and skills to their schools and communities. The biogas production and compost making by Block primary is backed by the aim of WMT, which is to minimise SW at source (Pongracz 2002). Furthermore, the biogas production and compost making revealed that SW treatment was done by Block primary (Lagman-Bautista 2020). Additionally, Pongracz and Pohjola (2004) mentioned that WMT is aimed at encouraging the conservation of resources by applying waste management and avoidance of resource loss. This means that with biogas production and compost-making SW like leftover food, vegetable peels, fruit peels, sweepings of grass and leaves were used as resources to make gas for cooking in the school kitchen and manure for the school garden.

4.2.2 Findings from participant observations and discussions

4.2.2.1 Reuse

The findings from participant observation showed that at Block Primary, they used large tins for baking steamed bread. These tins were used as packaging for fruit salad and jam. They are approximately three-litre containers. The learners and the researcher observed and participated in the steam bread making during the observation. This was an economical way of making bread than buying from the shops and using baking trays. After use, the tins were cleaned and stored in the kitchen storeroom.

Reusing SW material and maintaining cleanliness in the school environment can be achieved through this approach. Meanwhile, at Block Primary, it was revealed that local pig farmers were allowed on Fridays to collect food for their pigs at no cost. This food comprised of food leftovers, fruit peels, vegetable peels and, from the school garden, vegetable leaves. This was a way of reusing SW as it was being taken for another use other than the original one. The other two schools, Alfa and Camp, did not have the SW reuse initiatives.

4.2.2.2 Burning

Results from participant observation revealed that during break time, the learners and researcher picked up SW like papers, plastics from chips and sweets containers, and soft drink cans. At Alfa primary, the SW from the outdoor bins was sorted by five learners, the researcher and the two caretakers into plastic refuse bins before final collection by the garbage truck or burning. The SW was burnt when the refuse truck failed to collect. At the same time, the observation at Block Primary School uncovered that SW were combined and stored in refuse bags upon arrival at a SW centre. At this SW centre, the SW is sorted by the learners, the researcher, and caretakers.

The papers, plastics and small tins were disposed of at the illegal dumpsite and burnt. At Camp Primary, SW was put into refuse bags. Unused papers and waste materials such as leftover food and fruits are disposed of by being incinerated at a specific location. All three schools had a designated area for the burning of SW. Every primary school has a centre for storing SW packed in refuse bags until it can be collected, reused, recycled or burnt. The three schools burnt the SW within one week

of collection to avoid stench smell and breeding rats or cockroaches. The finding supports the finding of Makhubele (2017), who mentioned that the most preferred method of disposal by primary schools was burning SW at the illegal dumpsites on school grounds.

4.2.2.3 Recycling

SW, such as plastics, tins, boxes and wood, was used by learners and the researcher to make projects such as electrical circuits in NS, and musical instruments in SS like guitars, drums and shakers. The mentioned instruments were made from various SW found and collected in the schools' bins. The SW used by learners and the researcher were readily available from the schools' bins. The SW was safe and cheap, above-mentioned the instruments mentioned above. The finding supports the finding of Yeboah (2017), who mentioned that teachers can collect SW material and turn it into instructional resources for effective teaching, which will help the school learners to understand what they are taught. The findings support those of Yeboah (2017) who found that waste material used in making the instructional resources did not pose any danger to the safety of participants and was a cheaper way of obtaining teaching resources. This is one way to recycle SW material and clean the school environment. The findings agree with Kandole's (2021) that learners were taught how to make potted plants from SW, such as plastic bottles. At Camp Primary, the results also showed that the school was recycling SW, like plastic, paper, and soft drink cans. The collection of SW, like plastic and metal cans, was done by a recycling company for further processing to make more usable products.

The learners, researchers and caretakers at Camp Primary separated plastic, paper, garbage and soft drink cans into different plastic bins. The separated plastic and soft drink cans were stored for the local recycling company to collect. At Alfa, primary SW was packed into refuse bags and was not separated into plastic, paper and garbage. The SW is collected by a municipal refuse truck once a week. However, SW at Block Primary was packed into refuse bags after being separated into plastic, paper, garbage and tins. Block primary collects SW on their own with their school tractor. The study's findings concur with Ezati et al. (2017) that recycling is an option for dealing with SW at school, where selected SW will be used to make other products. The results revealed that at Block Primary, local waste pickers collect plastics for recycling. The

learners, researcher and caretakers were involved in picking, sorting, packing, and burning SW at all three schools.

4.2.2.4 Reducing

Findings showed that at Block, they use the reduction of SW as an initiative. They have a biogas tank and compost-making as initiatives to reduce SW.

4.2.2.4.1 Biogas production

At Block Primary, the results revealed that the school practices reduction of SW through the biogas production plant using SW, like vegetable and fruit peels, to produce gas for cooking in the school kitchen. The learners and the researcher were involved in collecting vegetable peels, fruit peels, rotten vegetables from the garden, and fruit and food leftovers from the bins around the kitchen. This type of SW was fed into the biogas tanks to enable the gas-making process to start. This was not revealed in any literature. The biogas system uses SW in the form of garbage like leftover food, rotten vegetables from the garden or fruit, and peels from fruits and vegetables. The biogas system comprises two underground tanks; an inputs sink for putting the items in the tank, pipes, and a gas stove. This result shows that the biogas system is very important during this load shedding time and is simple and cheaper to produce.

4.2.2.4.2 Compost making

It was confirmed at Block Primary that there is compost-making that benefits the school garden. Swept-up grass and tree leaves from the school premises create the compost layers. Compost is used in the school garden as manure. The learners and researcher participated in the sweeping of the school park. They collected the sweepings comprising grass and tree leaves to the compost heap to make compost layers. This result concurs with Matsekoleng (2017) that compost was made from vegetable SW to produce manure for the primary school garden. Learners are practically involved when making compost with SW, like cutting grass and dry leaves. The learners are imparted with skills that will help them even in the community. The finding further concurs with Nthalivi and Mswela (2016) that school garden positively impacts learners' environmental knowledge, attitude, and behaviours by involving them practically in SWM. This analysis identifies that if all primary schools can have compost, it would assist in reducing SW like dry grass, tree leaves and vegetable

leaves, as well as the cost of buying fertilizers for the school garden. Block Primary was located on a farm, and they had a big garden with vegetables like cabbages, onions, and spinach. This is in line with the findings of Nthaliwi and Mswela (2016); and Matsekoleng (2017) that the learners were involved practically in managing SW by assisting the gardening staff by bringing swept-cut grass and dry leaves to the compost. However, more needs to be done for the learners to start learning more gardening skills, such as mulching, that is, putting dry grass and leaves on top of the soil to prevent evaporation, because this will help them even at their homes.

Under participant observation, there was one similar EE initiative of burning SW at designated areas. Recycling of SW was found in two out of three schools, that is, Block and Camp primary. However, at Block Primary, they are reusing SW such as garbage through a biogas plant and compost making, which was not in all the other schools.

4.2.3 Findings from document analysis and discussion

4.2.3.1 Recycling

The study combined the findings from all three schools because the analysed documents were identical in nature, and no difference was observed. The sampled and analysed documents included CAPS documents for grade 6 NST and grade 6 LS, textbooks for grade 6 NST and grade 6 LS, and grade 6 learners' activity books. The researcher sampled the grade 6 class because it was the exit grade in the intermediate phase. The grade 6 class had more knowledge and experience managing SW in the primary schools. These documents are briefly discussed below:

4.2.3.1.1 CAPS documents

The findings from the documentary analysis showed that the three schools, Alfa, Block and Camp Primary, are using CAPS. The CAPS documents that were analysed were used by all teachers who taught NST and LS grades 4 to 6. It was found that these CAPS documents do not address SWM directly as a topic, but they address SWM indirectly in other topics. The NST and LS CAPS documents state that one of the general aims of the SA curriculum, as indicated in each subject CAPS document, is 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. In grade 6 NST, topics like water pollution

and pollutants, in this case, known as SW, can be found under environmental justice. Another topic in grade 6 NST, where the researcher found SW being infused, is electrical Circuits, where learners are instructed to make an electrical circuit using recyclable material. The recyclable material is also referred to as SW. These CAPS documents are used in conjunction with the textbook and activity book for learners and the projects that are practically given to the learners. The above was confirmed from the textbook as well as the activity book.

4.2.3.1.2 Textbooks

The findings from the three primary schools revealed that the teachers used the following sampled textbooks to plan and extract activities: for NST grade 6, Platinum and Siyavula; LS grade 6, Oxford and Spot on grade 6. The teachers teaching grade 6 NST and grade 6 LS were using the same textbooks mentioned above per advice from their subject advisers. These textbooks are printed in line with CAPS documents. The researcher found the same findings as in CAPS documents that SWM is indirectly addressed through certain topics. For instance, in NST, there is an activity of making an electric circuit using recyclable material, that is, recycling SW. Another topic is making model vehicles using SW material. Learners are expected to design a filter. Also, in grade 6 NST, there is a topic like water pollution where learners are expected to identify SW that pollutes water. In Life Skills, there is an activity on making a musical instrument using recyclable waste. Examples are guitars, drums and shakers made from recyclable material, that is, SW, like empty tins, five-litre containers, wood, rubber, plastic, and wires. It was found that activities in the textbooks were given to learners as informal tasks, that is, classwork or formal tasks, such as projects.

4.2.3.1.3 Classwork books/ Activity books

The findings from Alfa, Block and Camp primary showed that sampled classwork books of grade 6 learners were analysed and were in line with the activities in the textbooks and CAPS documents. The topics covered in grade 6 NST classwork books that indirectly linked SWM are knowing all types of water pollution and pollutants, Knowledge of recycled material and reuse of solid material; Classwork on water pollution in NST. Classwork on types of pollution was given in NST grade 6. The teachers taught the learners about pollution caused by poor SWM in NST grade 6. They also taught learners to use SW like boxes, tins, bottles, and plastic to make other

goods as their formal projects. Learners were taught that SW materials can be raw materials of other products and can be reused. Learners were asked to make an electric circuit in NST grade 6 using SW materials. In LS grade 6, learners used SW materials to make musical instruments and 3D shapes as part of formal tasks. This, therefore, means that learners in grade 6 NST and LS were taught about recycling.

The results showed that all three schools recycled SW like boxes, tins, plastic and wooden boards to make teaching and learning equipment like drums, guitars, shakers, and electrical circuits. This result agrees with Yeboah (2017), who mentioned that SW was used to make educational and instructional material and was easy and cheap to make and use. The CAPS documents for NST grades 4-6, LS grades 4-6, Textbooks for NST grade 6 (Platinum NST), LS grade 6 (Oxford Life Skills) and classwork books were made available for analysis. The results revealed that textbooks and classwork books had activities on SWM, although there was no evidence of a topic called SWM. For example, learners were given a practical activity to make musical instruments using recyclable SW.

Furthermore, learners were given a project in NST for an activity of making an electric circuit using SW, while in LS, there was an activity on making a musical instrument using SW such as tin, five-litre containers, wood, rubber, plastic and wires. This finding agrees with the DoBE (2011) that the NCS Gr. R-12 has integrated EE in all subject policy documents.

Among these data collection methods, there were similarities in EE initiatives used to manage SW. The similar initiatives among the three schools were the provision of bins in classes and outdoors, SW awareness, burning of SW, recycling SW, reusing of SW, SWM events and use of SW to make instruments used for teaching and learning. The other EE initiatives not found in the other two schools were only at Block Primary School, which involved reducing SW through the creation of compost for use in the school garden and the generation of biogas for cooking in the school kitchen. Furthermore, at Camp Primary, there was SWM competitions and the use of wooden pallets to make boundary wall at Camp Primary School. This was not found in the other two schools.

4.2.4 Successes of SWM initiatives in primary schools

Results from semi-structured interviews revealed that at Block and Camp primary schools, after the implementation of solid waste management activities in the classroom, the effect of the lesson/s on the learners was positive. Learners could take care of their classrooms and the outdoor environment of their schools. The schools were clean. Also, at the same schools, study participants mentioned that learners could manage the SW at their schools. Learners enjoy practically doing assigned tasks, especially when it has an effect on their daily life at school and home. Learners will be useful in implementing SWM at their schools and communities.

The results from semi-structured interviews from Camp Primary revealed that the learners were recycling plastic for financial benefit. There should be a school structure to manage SWM so it is not individualized and mismanaged. If recycling is done properly by schools, they will realise financial benefits. A formal structure must be set up for the proper management of SWM.

Both the semi-structured interview and participant observation results indicate that at Block and Camp primary, learners were practically involved in all SWM activities, such as picking up papers and plastics, recycling plastics and soft drink cans, and involvement in SW competitions and other activities. The learners were imparted with skills when they were practically involved in SWM, such as recycling, and gardening skills like mulching and compost making. This result confirms that the more the learners are involved in SWM at their school, the better the implementation of SWM. Findings from interviews and participant observation indicate that SW, like soft drink cans and plastics, were collected and stored for collection by recyclers. The involvement of learners in sorting SW for recyclers to collect yielded results at Camp Primary, meaning that it is very possible to implement recycling as an EE initiative to manage SW at the school.

There was a noticeable change in behaviour among pupils after the project as learners could sort SW, dispose of them properly, and reuse some of the waste. As a result, schools are making little money from SW, which was used to improve SWM. For this

study, evidence from all participants showed that learners were practically involved in the SWM of the school, leading to clean environments at the primary schools.

Findings from the three data collection methods revealed that teachers at the participating schools gave NST and LS projects to grade 6 learners, using recyclable SW to make electrical circuits and musical instruments such as guitars, drums, and shakers. This means that the inclusion of EE across the curriculum, will positively impact SWM in primary schools. This means progress is being made despite SWM not being a stand-alone topic in the curriculum. Implementing such SWM projects in class assists learners with knowledge of SW and its management. Since it's a hands-on project, learners were interested in doing it.

4.2.5 Challenges of SWM initiatives in primary schools

Findings from semi-structured interviews show that lack of support from school management teams due to the unavailability of funding and other resources affected the proper SWM. The funding would assist in procuring equipment and other resources, like posters, required for improving SWM at primary schools. The results prove that a lack of support from school managers in terms of finance will adversely affect SWM in primary schools, resulting in poor SWM. Financial support will ensure the purchase of required SWM resources like recycling bins and other accessories. The respondents, during semi-structured interviews, exposed both a lack of financial and human resources as a threat to SWM. During semi-structured interviews, one of the respondents said that schools do not have policies that specifically look into SWM. The lack of SWM policies in the three schools will cause the poor implementation of EE initiatives that manage SW. SWM policies will go a long way in assisting learners and teachers in implementing the EE initiatives.

The finding also showed that SWM was time-consuming in primary schools. This makes it difficult for the interested teachers to be involved in SWM. Ms Tall stated that there was a need for training teachers regarding the management of SW. This confirms that no time was allocated for SWM on the school timetable. The schools that are trying to implement SWM are improvising. There was non-involvement or lack of support from the local municipality at Alfa primary and Block primary. The three primary schools were not part of any NGO like ECO schools and Waste wise. Also

revealed during semi-structured interviews and participant observation, Alfa and Block primary were attached to the local municipality waste minimization programme, though no activity showed that something was being done to sustain the SWM. For the three primary school participants interviewed, it was revealed that SWM mainly concentrated on picking papers and using recyclable materials in making learners' projects. A vast of SWM initiatives have not been explored. The results show that schools are practising SWM on their own. With better support, the SWM may improve significantly.

Document analysis and semi-structured interview findings revealed that the SA CAPS curriculum does not deal with SWM directly. This means that lack of implementation will continue if curriculum heads do not address this promptly. This confirms that SWM is not a standalone topic in a subject. It is taught indirectly through other EE topics, like water pollution in grade 6.

Findings from semi-structured interviews revealed that at Alfa, a primary lack of SWM knowledge and implementation of EE initiatives has affected SW's management. All three participating primary schools are trying to implement SWM through EE initiatives as evidenced by the learners' projects and the semi-structured interviews, participant observation and document analysis. However, proper SW recycling has not yet occurred as there are improvising by using plastic refuse bins instead of recycling bins. The findings prove that proper implementation is required. For it to happen, a primary school should have SWM resources, that is, equipment, human and financial resources.

Although several primary schools were implementing recycling bin usage, the contract with Indaloyethu, an NGO that was instrumental in advancing SWM, was abruptly cancelled due to the withdrawal of the core founders, WESSA, and the government. This was only found in the literature. It was notable from the responses that there were no NGOs in the district supporting SWM. This means SWM will not be effective in the district. It was also observed and confirmed during semi-structured interviews that two of the three schools are using plastic refuse bins to assist in recycling SW.

4.3 CHAPTER SUMMARY

Chapter four involved the reporting of findings and discussions for this study. The chapter was introduced, and the steps taken in the data analysis process were described. The findings for the data collected through semi-structured interviews, participant observations and document analysis were presented and discussed respectively. The conclusions, recommendations, avenues of future research and limitations of the study were presented in the next chapter.

CHAPTER 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 INTRODUCTION

As stated in Chapter 1, the study aimed to explore solid waste management in Amathole East District primary schools, specifically focusing on the following objectives: to investigate how EE initiatives are used to manage solid waste in primary schools, describe the successes of EE initiatives used to manage solid waste in primary schools, determine EE strategies that can be used to improve solid waste management in primary schools. In Chapter 2, information, knowledge, and contributions from other scholars in the chosen countries at the international, regional, and national levels were gathered through a literature review. Following this, empirical research was carried out in selected schools, where the sampled participants were engaged to collect data based on instructions and instruments outlined in Chapters 1 and 3. The aim and objectives were used to determine what type of data to gather, theoretically and empirically. Chapter 4 presented, analysed, and interpreted the data that were collected. This chapter aims to summarise the results, a conclusion, and some recommendations. The summary provides the empirical results of this investigation based on the research findings. The answers to the research questions provided in Chapter 1 serve as the conclusions. This study provides recommendations for various strategies that can be taken to guarantee that SWM is successfully implemented in primary schools. Thus, the research findings are summarized in the section that follows.

5.2 SUMMARY OF RESEARCH FINDINGS

The data concerned EE initiatives used to manage SW in primary schools and how EE initiatives are implemented to manage SW in primary schools around Amathole East District. The following is an overview of the study's findings.

5.2.1.1 Findings from semi-structured interviews, participant observation and documentary analysis

Data collection methods like semi-structured interviews, participant observation, and documentary analysis were used to discover the SWM initiatives. SWM initiatives found in the participating primary schools were providing bins in classes and outdoors, SW awareness, burning of SW, reducing SW, recycling SW, reusing of SW, and SWM

events. Only compost-making and biogas plants were found in one school, Block Primary. Also, participation in SWM competitions and reusing wooden pallets to make a boundary wall was discovered at Camp Primary School. All the participating primary schools were following the South African CAPS curriculum.

Also, results show that all the primary school teachers used awareness during class and assemblies to teach the learners about SWM. Learners were always reminded to pick up and throw into the bins SW in the form of papers, plastics, chips and sweets, empty packets, plastic bottles, soft drink cans and fruit peels.

The main findings from semi-structured interviews and literature revealed the provision of classroom and outdoor bins for throwing SW mentioned above. Also noted during semi-structured interviews and participant observation that all three schools have employed caretakers responsible for cleaning classrooms, and emptying classroom bins and outdoor bins in preparation for collection by the Municipality during and after school. Findings from semi-structured interviews showed that burning SW, such as papers and plastics, at illegal dumpsites for burning is one way used by the three schools to manage SW.

Results from document analysis showed that all three schools recycle SW like boxes, tins, plastic and wooden boards to make teaching and learning equipment like drums, guitars, shakers, and electrical circuits. Findings showed that CAPS documents have activities that require the recycling of SW. Findings further showed that all three schools had no policy on SWM. Furthermore, learners were given a project in NST to make an electric circuit using SW, while in Life skills, there is an activity on making a musical instrument using SW such as tin, 5lt container, wood, rubber, plastic and wires.

Both semi-structured interviews and participant observation showed that at Block Primary School, there was a biogas production plant that used garbage in the form of fruit and vegetable peels to make gas for cooking in the school kitchen. It was revealed that they were making compost for manure to be used in the garden at the same school.

Results from -structured interviews and participant observation show that the three primary schools had SWM events that also assist managing SW and educating learners about SW, such as a Market day, 'Love your space' campaign, a clean-up campaign and municipal SW competitions. At Camp Primary, the boundary of the play centre for pre-schoolers was made of wood from pallets obtained from deliveries of

stationery at the school and was constructed by one of the teachers and some learners. Findings from semi-structured interviews, participant observation and document analysis showed that SW such as plastics, tins, boxes and wood was used to do projects like musical instruments like guitars, drums and shakers for learners.

5.2.2 Successes of SWM initiatives in primary schools

It was found through semi-structured interviews that as learners are practically involved, the sense of responsibility also increases. Most participants confirmed that the level of participation of learners increase as SWM is taught in the classroom and practised outside. According to the data collection methods, most participants recycled SW to make projects in NST and LS, like musical instruments and electrical circuits. There was noticeable cleanliness in these three primary schools. Each classroom was equipped with a bin. The outdoor environments also had bins, though one school had a few bins outside. Learners could take care of their classrooms and the outdoor environment of their schools. The schools were clean. The results from semi-structured interviews from Camp Primary revealed that the learners were recycling plastic and soft drink cans for financial benefit. The learners were imparted with skills when they were practically involved in SWM, such as recycling, and gardening skills like mulching and compost making.

5.2.3 Challenges of SWM initiatives in primary schools

As indicated by most participants in this research, challenges overcome the successful implementation of the SWM in primary schools. Challenges have been identified: lack of time to fully implement the SWM initiatives; lack of funding for SWM initiatives from NGOs, Government, and Schools; lack of SWM resources like recycling bins; lack of training and support from various stakeholders like DoBE and NGOs.

5.2.4 EE initiatives that can be used to improve SWM in primary schools

The **initiatives** were presented in the form of recommendations in section 5.4.

5.3 RESEARCH CONCLUSIONS

Discussed in this part are the study's conclusions. The study results for this section were derived from the answers to the original research questions posed in Chapter 1.

- **What EE initiatives are there to manage solid waste in primary schools around Amathole East District?**

SWM initiatives found in the participating primary schools were the provision of bins in the classroom and outdoors; awareness of SWM activities at assembly by teachers; burning SW such as paper and plastic; SWM events such as competitions on SWM, clean up campaigns, love your space and market day; recycling SW such as plastic and soft drink cans as well as making teaching resources like musical instruments from SW such as tins, boxes, plastic and wood; reducing SW through compost making and biogas production plant; reusing SW like tins for baking steam bread. Therefore, there are existing EE initiatives to manage SW at primary schools.

- **How are EE initiatives used to manage solid waste in primary schools?**

Awareness of SWM was done by teachers daily on assembly. Teachers used duty rosters to monitor their learners to pick SW during break. The primary schools throw SW, like plastic and papers in the bins provided for each classroom and big bins for the outdoor environment. SW, like papers and plastics, was mainly burnt if not collected to avoid smells and breeding rates. Two primary schools have a link with the Local Municipality, and one of the primary schools is involved in competitions organised by the Municipality. Due to the availability of land at one of the primary schools, they make compost used in the school garden, and also a biogas production plant was available for producing gas for cooking at the school canteen. To implement SWM, the teachers integrated the CAPS Curriculum in the classroom and outdoors through learner projects, as stated above.

- **How successful were the EE initiatives used to manage solid waste in primary schools?**

Results from semi-structured interviews revealed that at Block and Camp primary schools, after the implementation of solid waste management activities in the classroom, the effect of the lessons on the learners was positive. Also, at the same schools, study participants mentioned that learners could manage the SW at their schools. Learners could take care of their classrooms and the outdoor environment of their schools. The schools were clean. The learners were imparted with skills when

they were practically involved in SWM, such as recycling, and gardening skills like mulching and compost making.

However, there have been notable challenges in trying to implement SWM in primary schools, such as schools not having SWM policies to manage SW, lack of time to fully implement the SWM initiatives, lack of funding for SWM initiatives from NGOs, Government, and Schools; lack of SWM resources like recycling bins; lack of training and support from various stakeholders like DoBE and NGOs.

- **What can be done to improve EE initiatives used to manage solid waste in primary schools?**

Results from semi-structured interviews showed that SWM awareness needs to be implemented. Involvement of local municipalities, NGOs and other SWM organisations in the primary school could boost SWM. The DoBE should have workshops by subject advisors focusing on SWM. The provision of recycling bins may have a lasting positive impact on SWM. This study adds new information to the field of the study in that the results on the use of biogas as a source of energy was not mentioned in any of the literature that was covered. The use of biogas is important as load shedding is currently affecting many countries. Another new result was the existence of collaboration between Block primary school and the pig farmers to collect SW like food leftovers as feed for pigs which was also not mentioned by any scholar from the reviewed literature. This question was answered as a recommendation in the next section.

5. 4 RECOMMENDATIONS

The successful implementation of SWM initiatives requires the involvement of learners and teachers at the school level, DoBE, and NGOs. The study's conclusions led to the following recommendations that could improve EE initiatives used to manage SW in primary schools.

5.4.1 School

At the school level, learners should be taught more about SWM in their respective subjects. Five of the six participants during semi-structured interviews confirmed that SWM awareness and education are required to successfully implement SWM

activities. Learners' and teachers' awareness of SWM needs to be intensified and prioritised by the primary schools for effective management of SW. The learners and teachers should be practically involved and participate in the SWM activities of their schools. Teachers and learners need to be resourced with SWM information. The application of SWM in primary schools is greatly aided by SWM awareness. Learners' practical involvement in practising SWM is through the collection, sorting, storing, reducing, reusing, recycling and disposing of SW. This study revealed that learners learn effectively when SWM activities are practical.

The primary school learners should be exposed to SWM competition at school, district, provincial and national levels. The learners learn effectively when SWM activities are practical. The findings during interviews showed that learners should be incentivised to participate in SWM activities to stimulate their interest in SWM and that involvement with the municipality and NGOs may result in schools receiving much-needed recycling bins and assistance on how to go about SWM. The more the SWM educational programmes, the better it will be implemented in schools. Exposure to more SWM reading material will aid learners in competitions and implementing SWM.

Discouraging the burning of solid waste should be emphasised in schools. Make sure that solid waste is picked up every week. Encourage learners to pick up the garbage and use the correct recycling bins to dispose of SW. The teachers should draft a duty roster per class per week for learners, and teachers must supervise cleaning the classroom and the outdoor environment. Schools should give incentives to clean classes to encourage better solid waste management.

Each school is recommended to use compost and a garden to manage SW. The schools should procure recycling bins to assist in SWM. The primary school can sell the generated SW to waste companies, waste pickers, and piggery farmers for income generation for the school. Schools should start involving stakeholders in the planning and developing SWM policy to govern how SW can be managed. The school teachers should be encouraged to form SWM clubs that will take care of the environment of the school.

The finding below was found in the literature and was not found in any of the schools. The use of audio visuals can be an interesting way to expose learners to SWM

activities. Training learners through interesting media like film animation could capture their attention and improve their understanding. The use of visual aids and audio-visuals in teaching children about SWM might create a positive impact as they are not boring to children.

5.4.2 DoBE

It is recommended that since DoBE is the custodian of the CAPS curriculum, it should take a central part in the teaching of SWM through EE. DoBE, through the subject advisers, should arrange workshops specifically on how to teach about SWM in each subject. It should also source for funding this programme for SWM so that many disadvantaged schools will be involved. Also, the researcher recommends that a section within DoBE be set up to plan, organise, implement and monitor SWM in school.

5.4.3 NGOs, LOCAL MUNICIPALITIES, AND WASTE COMPANIES

The primary schools are recommended to search and partner with the local municipality, waste companies, and NGOs for SWM education and training, competitions, donations, and other resources. They should be able to provide prizes for participation in SWM events, like t-shirts, recycling bins, and stationery. Also, through the partnership, schools will link with other schools in the district, province, and national levels. The semi-structured interviews revealed a need to work with the local municipalities and other NGOs to further improve the SWM at primary schools. The municipality would inject funds and ideas, have awareness, SW information, and SW posters and run competitions to spearhead proper SWM. It is important for local municipalities, NGOs and other recycling companies to play their role in managing SW in primary schools as they are more knowledgeable and have resources to champion the SWM.

5.5 LIMITATIONS OF THE STUDY

The primary schools under study are in the Amathole East District, and the findings may not represent the EE initiatives of other primary schools locally. The participants in the selected sample may not fully represent the ideas and decisions of the population as the researcher chooses participants who fit a certain profile given above.

Due to COVID-19 restrictions, the researcher could not interview learners to understand SWM.

5.6 AVENUES FOR FURTHER RESEARCH

Perhaps further research should be conducted in other phases and secondary schools. This topic should be explored extensively at primary schools, preferably in the Eastern Cape Province, as this study was limited to three primary schools in one district. It is also recommended that further research be carried out in senior phases and Further Education and Training Phases (FET), which will include more schools, circuits, and districts or expanded provincially. CAPS curriculum entails that EE is taught in every subject; however, SWM constitutes a very small portion of some subjects, such as NST, SS and LS, in the intermediate phase. More needs to be done to investigate how other subjects like languages and mathematics integrate SWM in teaching EE. All schools that participated in the study were independent of the support of NGOs that deal with SWM. It will be necessary to explore SWM from NGO-affiliated schools in the Province. As the researcher explored primary schools, the next research may look at secondary schools.

5.7 SUMMARY OF THE CHAPTER

The study aimed to explore SWM in primary schools around Amathole East District, with the following objectives: To investigate how EE initiatives address solid waste in primary schools and to determine EE initiatives that can be used to improve solid waste management in primary schools. This chapter also provided an extensive summary of the findings from the previous chapter, chapter four. Recommendations to schools, teachers, learners, DoBE, Municipalities, waste companies, and NGOs were given respectfully, and conclusions were also made based on the study's findings accordingly, as this chapter is the last chapter of this study.

5.8 CONCLUDING REMARKS

It has been a long, tedious journey full of adventure, ups and downs. As a family man, an administrator, and a student, this journey was long and had challenges. However, I learnt that human beings are responsible for successfully protecting the environment through our responsible behaviour. In 2020, February I attended a colloquial in

Pretoria. I had to travel 1200km. COVID-19 has been part of the journey since March 2020 and had its devastating impact. During the lockdown, progress was stalled. As Covid-19 was easing down, research tutorial lessons kicked off. This has many benefits, like interaction with other students and supervisors. Workshops and conferences came in handy in assisting me to push my studies. My supervisor was my pillar of success as she was very supportive and never gave up from day one.

I am advocating for clean school environments as I have researched for years through my topic on SWM. I see myself in a better position to carry out further research on EE because of the skills acquired in doing this research, the conferences, the workshops and the tutorials attended thus far. This has made me a better teacher professionally. This journey has accorded me the chance to learn and be able to present my work through the Microsoft Teams application and Zoom.

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LIST OF APPENDICES
APPENDIX A: ETHICAL CLEARANCE LETTER FROM INSTITUTION



UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2022/05/11

Ref: **2022/05/11/51027879/34/AM**

Name: Mr I Nyati

Student No.:51027879

Dear Mr I Nyati

Decision: Ethics Approval from
2022/05/11 to 2025/05/11

Researcher(s): Name: Mr I Nyati
E-mail address: 51027879@mylife.unisa.ca.za
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Supervisor(s): Name: Dr M.V. Makokotlela
E-mail address: emakokm@unisa.ac.za
Telephone: 0124294881

Title of research:

**SOLID WASTE MANAGEMENT THROUGH ENVIRONMENTAL EDUCATION
INITIATIVES IN PRIMARY SCHOOLS OF AMATHOLE EAST DISTRICT**

Qualification: MEd ENVIRONMENTAL EDUCATION

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2022/05/11 to 2025/05/11.

*The **medium risk** application was reviewed by the Ethics Review Committee on 2022/05/11 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.



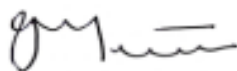
University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.
4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.
6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
8. No field work activities may continue after the expiry date **2025/05/11**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

*The reference number **2022/05/11/51027879/34/AM** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Kind regards,



Prof AT Motlhabane
CHAIRPERSON: CEDU RERC
motlhat@unisa.ac.za



Prof Mpine Makoe
ACTING EXECUTIVE DEAN
qakisme@unisa.ac.za

Approved - decision template – updated 16 Feb 2017



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APPENDIX B: ETHICAL CLEARANCE LETTER FROM EASTERN CAPE PROVINCIAL EDUCATION



Province of the
EASTERN CAPE
EDUCATION

CORPORATE PLANNING, MONITORING, POLICY AND RESEARCH COORDINATION

Steve Vukile Tshwete Complex, Zone 6 Zwelitsha, 5608, Private Bag X0032, Bhisho, 5605 REPUBLIC OF SOUTH AFRICA.

Enquiries: Ms. F. Pakade Tel: 040 608 7170/4001 . Fax :040 608 4372. Email: fundiswa.pakade@ecdoe.gov.za

Website: www.ecdoe.gov.za

Date: 30 June 2022

Mr. Isiah Nyati
5539 Vulli Valley
Butterworth
4960

Dear Mr. Nyati

PERMISSION TO UNDERTAKE A MASTERS RESEARCH: SOLID WASTE MANAGEMENT THROUGH ENVIRONMENTAL EDUCATION INITIATIVES IN AMATHOLE EAST DISTRICT

1. Your application to conduct the above-mentioned research involving 21 participants, that is two teachers and 5 learners from each of three primary school in the Amathole East District under the jurisdiction of the Eastern Cape Department of Education (ECDoE) is hereby approved based on the following conditions:
 - a. there will be no financial implications for the Department;
 - b. institutions and respondents must not be identifiable in any way from the results of the investigation;
 - c. no minors will participate without the consent from the parent/guardian;
 - d. it is not going to interrupt educators' time and task;
 - e. the research may not be conducted during official contact time;
 - f. no physical contact with educators and learners, only virtual means of communication should be used and that should be arranged and agreed upon in writing with the Principal and the affected teacher/s;
 - g. you present a copy of the written approval letter of the Eastern Cape Department of Education (ECDoE) to the Cluster and District Directors before any research is undertaken at any institutions within that particular district;
 - h. you will make all the arrangements concerning your research;



Customer care line: 086 063 8636

Website: www.ecdoe.gov.za





- i. should you wish to extend the period of research after approval has been granted, an application to do this must be directed to Chief Director: Corporate Strategy Management;
 - j. you present the Department with a copy of your final paper/report/dissertation/thesis free of charge in hard copy and electronic format. This must be accompanied by a separate synopsis (maximum 2 – 3 typed pages) of the most important findings and recommendations if it does not already contain a synopsis;
 - k. you present the findings to the Research Committee and/or Senior Management of the Department when and/or where necessary;
 - l. you are requested to provide the above to the Chief Director: Corporate Strategy Management upon completion of your research;
 - m. you comply with all the requirements as completed in the Terms and Conditions to conduct Research in the ECDoE document duly completed by you;
 - n. you comply with your ethical undertaking (commitment form);
 - o. You submit on a six-monthly basis, from the date of permission of the research, concise reports to the Chief Director: Corporate Strategy Management.
2. The Department reserves a right to withdraw the permission should there be non-compliance to the approval letter and contract signed in the Terms and Conditions to conduct Research in the ECDoE and/or legal requirements to do so.
 3. The Department will publish the completed Research on its website.
 4. The Department wishes you well in your undertaking. You can contact the Mrs. Fundiswa Pakade on the numbers indicated in the letterhead or email fundiswa.pakade@ecdoe.gov.za should you need any assistance.

T. MASOEU
CHIEF DIRECTOR: CORPORATE STRATEGY MANAGEMENT
FOR SUPERINTENDENT-GENERAL: EDUCATION



APPENDIX C: FIELD NOTES DURING PARTICIPANT OBSERVATION FOR LEARNERS AND TEACHERS

DATE	TIME	GROUP	ACTIVITY	DURATION
WEEK 1	Break	Learners	<p>School environment</p> <ul style="list-style-type: none"> • Location, enrolment, brief description, space for SWM, cleanliness, availability of bins, other SWM initiatives, involvement of municipality. Awards for SWM, photos, and caretakers. <p>Break observation – Case A</p> <ul style="list-style-type: none"> • Use of bins: position and visibility of bins • School corridors: to observe cleanliness and how solid waste is managed. • School notice board: to check if participants visit the notice board and what notices are pinned on the board. • School grounds: to observe cleanliness and how solid waste is managed. • Learner behavior on solid waste: to observe cleanliness and how solid waste is managed. • Supervision of learners while eating or playing: Visibility of learner prefects and teachers to monitor how solid waste is managed. 	10-20 minutes
	Tuition time	Teachers and learners	<p>Lesson observation: Case A</p> <ul style="list-style-type: none"> • Use of classroom bin • Arrangement of the classroom • Posters on the wall • Presentation of lesson by teacher • Involvement of learners during lesson • Teaching aides used • Content taught • Activities given to learners 	20-40 minutes

APPENDIX D: INTERVIEW QUESTIONS FOR TEACHERS

What grades are you teaching?

Grade 4	Grade 5	Grade 6	Other : _____
---------	---------	---------	---------------

What subject/s are you teaching?

Languages. State the Language:	Mathematics	Natural sciences and Technology	Life skills
Social sciences	Other:	Other:	Other:

What are your qualifications?

Certificate	Diploma	Bachelor	Honours	Masters/Doctorate	Other:
-------------	---------	----------	---------	-------------------	--------

Was environmental education one of your course modules?

Yes	No
-----	----

What do you understand by the term solid waste?

What solid waste examples are generated at the school?

How do you manage solid waste?

Does your school have a policy on solid waste management?

Yes	No
-----	----

How is it being implemented?

If yes,

If no,

How does your school manage solid waste?

What Environmental Education initiatives does the school employ to address solid waste?

Who is responsible for the management of solid waste at the school?

Learners	Teachers	Caretakers	Municipality	Other:
----------	----------	------------	--------------	--------

Are there bins available?

Yes	No
-----	----

If yes, where are the bins located?

Every classroom	Corridors	Outdoor	Other:
-----------------	-----------	---------	--------

If no, what do you use as an alternative?

How are the bins used?

Do you agree that the curriculum covers solid waste management?

Yes	No
-----	----

If Yes Why? If No why?

What are the topics in your subject that address solid waste management?

What are the classroom activities that involve solid waste?

How do you integrate classroom activities to outdoor activities for solid waste management?

How do learners react to the integration of solid waste management activities?

Who is involved in doing these solid waste management activities?

After implementation of solid waste management activities in the classroom, what was the effect of the lesson/s to the;
Learner:

School environment:

How do other colleagues view the issue of solid waste management?

Explain the role of other colleagues in solid waste management.

Is their participation satisfactory and why?

Yes	No
-----	----

Why? _____

Do textbooks cover solid waste? If yes list the topics.

Are there any school events that support solid waste? List them.

Is solid waste covered in the learner's note and classwork book?

Are there any products made by solid waste at the school? Name them.

What are your suggested solid waste management initiatives?

APPENDIX E: TEMPLATE FOR REQUESTING PERMISSION TO CONDUCT RESEARCH

To: The Principal (_____ Primary School)



Subject: Request for permission to conduct research at your school

Title of the title of your research: Solid waste management through Environmental Education initiatives in primary schools of Amathole East District.

Date: 04/07/2022

Name of the person to who you address the request: Principal

Department of the person:

Contact details of the person (tel and email address): tel: _____ email: _____

Dear Principal

I, **Isiah Nyati** am doing research under the supervision of **DR M.V. Makokotlela**, a Senior Lecturer in the Department of **Science Education** towards an **MEd** at the University of South Africa. The researcher is self-funded. We are inviting you to participate in a study entitled **Solid waste management through Environmental Education (EE) initiatives in primary schools of Amathole East District**.

The aim of the study is to **investigate how schools can utilize EE initiatives that are successful to improve solid waste management in primary schools around Amathole East District**.

Your school has been selected because it is a **primary school that is in the respective district**. The study will entail **observation of lessons and breaks; interviewing teachers and documentary analysis of learner activity books and curriculum documents**.

The benefits of this study are **that schools will know that solid waste is a resource, schools can make additional money from selling solid waste, and schools can be smart and tidy and may produce solid waste conscious youth**. Potential risks are **injuries due to broken pieces of metal or bottles and infections by bacteria**.

There will be no reimbursement or any incentives for participation in the research. Feedback procedure **will entail the researcher produce a hardcopy of the final research to the district director, circuit manager, principals and teachers**.

Yours sincerely

A handwritten signature in black ink, appearing to read "Isiah Nyati".

ISIAH NYATI (Researcher)

APPENDIX F: PARTICIPANT INFORMATION SHEET

Date: 04/07/2022



Title: SOLID WASTE MANAGEMENT THROUGH ENVIRONMENTAL EDUCATION INITIATIVES IN PRIMARY SCHOOLS OF AMATHOLE EAST DISTRICT.

DEAR PROSPECTIVE PARTICIPANT

My name is **Isiah Nyati** and I am doing research under supervision of **DR M.V. Makokotlela**, a Senior Lecturer in the Department of **Science Education** towards a **MEd** at the University of South Africa. The researcher is **self-funded**. We are inviting you to participate in a study entitled **Solid waste management through Environmental Education initiatives in primary schools of Amathole East District**.

WHAT IS THE PURPOSE OF THE STUDY?

This study is expected to collect important information that to contribute towards successful solid management in primary schools, under the care of responsible learners and teachers through EE initiatives. The study could help primary school teachers and learners understand that solid waste is a resource, schools may make addition money from selling solid waste, and schools can be smart and tidy and may produce solid waste conscious youth.

WHY AM I BEING INVITED TO PARTICIPATE?

You are invited because **you teach at a primary school or you are a learner at a primary school**. I obtained your contact details from **the school office after getting permission from the Principal**. The **Protection of Personal Information Act, no 4 of 2013**, necessitates the disclosure of how access was gained to the personal information of prospective participants. The approximate number of participants from three chosen schools is as follows **9 teachers (three from each school) and 15 learners (five from each school)**.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

Teachers' role in the study is to teach learners in class, monitor learners during observations, provide documents requested for documentary analysis. The learners' role in the study is to participate in observations to be carried out. Due to restrictions of Covid-19 learners will not be interviewed but will participate in observations. The study involves documentary analysis, semi-structured interviews and observations. The type of questions that will be asked open ended,

closed, structured and semi structured questions. The expected duration of the activities listed above is 20 to 30 minutes.

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 to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent (adult)/ assent (participant younger than 18 years old) form. You are free to withdraw at any time and without giving a reason.

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

The benefits of this study are that schools will know that solid waste is a resource, schools can make additional money from selling solid waste, and schools can be smart and tidy and may produce solid waste conscious youth. Describe the presence or absence of possible benefits for the participant, the participants as a group, the scientific community and/or society

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

Negative consequences

Participants may be exposed to negative labelling due to picking up of solid waste which might lead emotional discomfort. In the collection of solid waste participants may be injured by broken bottles, and may be accidentally infected by diseases.

Measures that will be taken if injury or harm attributable to the study occurs:

All participants will be trained on the importance of the research and well as health and safety measures to be undertaken. Provision of gloves aprons and masks is of essence. Teachers will be requested to monitor any activity of the learners to avoid harm. In case of any adverse event the Ethics committee, the school and the parents will be notified, as well as taking the learner to the respective health practitioners.

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

You have the right to insist that your name will not be recorded anywhere and that no one, apart from the researcher and identified members of the research team, will know about your involvement in this research **OR** Your name will not be recorded anywhere and no one will be able to connect you to the answers you give. Your answers will be given a code number or a pseudonym and you will be

referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings.

Your answers may be reviewed by people responsible for making sure that research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

Participants' anonymous data may be used for other purposes, such as a research report, journal articles and/or conference proceedings. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report. Please keep in mind that it is sometimes impossible to make an absolute guarantee of confidentiality or anonymity, e.g. when focus groups are used as a data collection method.

While every effort will be made by the researcher to ensure that you will not be connected to the information that you share during the focus group, I cannot guarantee that other participants in the focus group will treat information confidentially. I shall, however, encourage all participants to do so. For this reason I advise you not to disclose personally sensitive information in the focus group.

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

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. **Hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme.**

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

No payment will be received for participating in this study. No costs will be incurred by participants in this study.

HAS THE STUDY RECEIVED ETHICS APPROVAL

This study has received written approval from the Research Ethics Review Committee of the CEDU ERC, 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 **Isiah Nyati** on **0789848129** or email **51027879@myunisa.unisa.ac.za**. The findings are accessible for **three months**.

Should you require any further information or want to contact the researcher about any aspect of this

study, please contact **Isiah Nyati** on 0789848129 and email address: 51027879@mylife.unisa.ac.za.

Should you have concerns about the way in which the research has been conducted, you may contact

DR M.V Makokotlela on 0124294881 and email address: emakokm@unisa.ac.za.

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

Thank you.



(insert signature)

ISIAH NYATI

(type your name)

APPENDIX G: CONSENT TO PARTICIPATE IN THIS STUDY (Return slip)



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 am prepared to participate in the study.

I understand that my participation is voluntary and that 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 that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the _____ (insert specific data collection method).

I have received a signed copy of the informed consent agreement.

Participant Name & Surname (please print) _____

Participant Signature

Date

ISIAH NYATI

Researcher's Name & Surname (please print) _____

A handwritten signature in black ink, appearing to be "Isiah Nyati", written over a horizontal line.

04/07/2022

Researcher's signature

Date

APPENDIX H: A LETTER REQUESTING PARENTAL CONSENT FOR MINORS TO PARTICIPATE IN A RESEARCH PROJECT



Dear Parent

Your son/daughter/child is invited to participate in a study entitled **SOLID WASTE MANAGEMENT THROUGH ENVIRONMENTAL EDUCATION INITIATIVES IN PRIMARY SCHOOLS OF AMATHOLE EAST DISTRICT**

I am undertaking this study as part of my **Master's** research at the University of South Africa. The purpose of the study is **for the school going children to be involved and have knowledge of how to take care of the environment they are living in, which is, schools, town centres, suburbs or locations** and the possible benefits of the study are the improvement of **solid management in primary schools, under the care of responsible learners and teachers through EE initiatives**. I am asking permission to include your child in this study because **he or she is a primary school learner**. I expect to have **15** other children participating in the study. If you allow your child to participate, I shall request him/her to (delete what is not applicable):

- Take part in a classroom observation when he/she will be doing activities with the teacher during the normal tuition time for 20 to 30 minutes for one to two weeks.
- Take part in a outdoor observation when he/she will be interacting with other learners during the break time for 20 to 30 minutes for one to two weeks.

Any information that is obtained in connection with this study and can be identified with your child will remain confidential and will only be disclosed with your permission. His/her responses will not be linked to his/her name or your name or the school's name in any written or verbal report based on this study. Such a report will be used for research purposes only.

There are no foreseeable risks to your child by participating in the study however the following may be the risk: **Participants may be exposed to negative labelling due to picking up of solid waste which might lead emotional discomfort. In the collection of solid waste participants may be injured by broken bottles, and may be accidentally infected by diseases.**Your child will receive no direct benefit from participating in the study; however, the possible benefits to education are that the study **could help primary school teachers and learners understand that solid waste is a resource, schools can make addition money from selling solid waste, schools can be smart and tidy and may produce solid waste conscious youth**. Neither your child nor you will receive any type of payment for participating in this study. Your child's participation in this study is voluntary. Your child may decline to participate or to withdraw from participation at any time. Withdrawal or refusal to participate will not affect him/her in any way. Similarly you can agree to allow your child to be in the study now and change your mind later without any penalty.

The study will take place during regular classroom activities (or state when, if at an alternative time) with the prior approval of the school and your child's teacher. However, if you do not want your child to participate, an alternative activity will be available (state what the alternative activity will be). In addition to your permission, your child must agree to participate in the study and you and your child will also be asked to sign the assent form which accompanies this letter. If your child does not wish to participate in the study, he or she will not be included and there will be no penalty. The information gathered from the study and your child's participation in the study will be stored securely on a password locked computer in my locked office for five years after the study. Thereafter, records will be erased.


The benefits of this study are the study could help primary school teachers and learners understand that solid waste is a resource, schools can make addition money from selling solid waste, schools can be smart and tidy and may produce solid waste conscious youth.

Potential risks are: Participants may be exposed to negative labelling due to picking up of solid waste which might lead emotional discomfort. In the collection of solid waste participants may be injured by broken bottles, and may be accidentally infected by diseases. There will be no reimbursement or any incentives for participation in the research.

If you have questions about this study please ask me or my study supervisor, Dr M.V. Makokotlela, Department of Science Education, College of Education, University of South Africa. My contact number is 0789848129 and my e-mail is 51027879@mylife.unisa.ac.za. The e-mail of my supervisor is emakokm@unisa.ac.za. Permission for the study has already been given by Department of Education (DET/principal/SGB etc.) and the Ethics Committee of the College of Education, UNISA. You are making a decision about allowing your child to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow him or her to participate in the study. You may keep a copy of this letter.

Name of child: _____

Sincerely

_____	_____	_____
Parent/guardian's name (print)	Parent/guardian's signature:	Date:
NYATI.I		04/07/2022
_____	_____	_____
Researcher's name (print)	Researcher's signature	Date:

APPENDIX I: A LETTER REQUESTING ASSENT FROM LEARNERS IN A PRIMARY SCHOOL TO PARTICIPATE IN A RESEARCH PROJECT



Dear learner,

Date: 04/07/2022

My name is Teacher **Isiah Nyati** and would like to ask you if I can come and **watch you do some activities with your teacher and when you play outside on the playground. I am trying to learn more about how children do activities with their teachers as well as when they play with friends.**



If you say YES to do this, I will come and watch you when you are with your teacher doing **activities** as well as when you play on the playground. We will do a fun game where you have to answer some questions for me. I will also ask you to do some activities with me. I will not ask to you to do anything that may hurt you or that you don't want to do.

I will also ask your parents if you can take part. If you do not want to take part, it will also be fine with me. Remember, you can say yes or you can say no and no one will be upset if you don't want to take part or even if you change your mind later and want to stop. You can ask any questions that you have now. If you have a question later that you didn't think of now, ask me next time I visit your school.

Please speak to mommy or daddy about taking part before you sign this letter. Signing your name at the bottom means that you agree to be in this study. A copy of this letter will be given to your parents.

Regards

Teacher I.NYATI

Your Name	Yes I will take part 	No I don't want to take part 
Name of the researcher I.NYATI		
Date 04/07/2022		
Witness		

APPENDIX J: INTERVIEW TRANSCRIPT

INTERVIEW TRANSCRIPT

Teacher: Mr Virat

Case: Block primary

Good morning Sir?

Good morning how are you?

I am fine thank you. Ok, I would like to thank you for agreeing to participate in this study.

You are welcome, Sir.

Please note that this interview will be treated as confidential, also I believe you read the participant information sheet?

Ok, thank you. I read the information sheet. You may proceed with the interview.

Ok. What grades are you teaching?

I am teaching grade 4 to 6

What subject/s are you teaching?

I am teaching Natural sciences and Technology and English Home Language

What are your qualifications?

I am a holder of Bachelor of education

Was environmental education one of your course modules?

Yes

What do you understand by the term solid waste?

Defining it is a challenge but I think waste is like paper and plastic and it is difficult for it to rot.

What solid waste examples are generated at the school?

Waste found at this school are Papers, plastics, tins, boxes, food left overs, vegetable peels, grass and tree leaves

Does your school have a policy on solid waste management?

No, we don't have any policy, we act by improvising.

How is it being implemented?

If yes, -----

If no,

Not sure yet

How does your school manage solid waste?

They are many labeled bins around the school where solid waste is thrown. Some community members come to collect food left overs for their pigs for free. The school has a biogas tank next to the canteen. Garbage made up of vegetable and fruit peels are thrown in the tank for production of gas used for cooking. Learners collect solid waste material like boxes, bottle tops and tins for making projects.

What Environmental Education initiatives does the school employ to address solid waste?

Biogas tank initiative at the school canteen. Many Labeled bins 'keep the school clean' around the school along the paths and I the park. The primary school learners have a clean-up campaign for picking litter around the school. Waste pickers around the school collect and sell litter. Pig farmers collect food leftovers and vegetables for feeding pigs. The school canteen collects big tins for baking steam bread. Grass cut from the school environment and sweepings of leaves are sent to the school garden as mulching and making of a compost.

Who is responsible for the management of solid waste at the school?

The caretakers, teachers and learners are responsible for cleanliness of the school.

May you kindly provide some details?

Learners pick up papers and plastics in class during tuition time and outside during break. Caretakers pick up the litter after break and clean classes after school. Teachers monitor learners picking up their papers during break. Caretakers collect bins from classes and pack them into the plastic bins for storing at the waste room, waiting for collection by the school tractor.

Are there bins available?

Yes, they are available

If yes, where are the bins located?

They are found in every classroom. As well as outside in the parks and lanes.

How are the bins used/ managed?

The learners throw litter into the classroom bins and outdoor bins. On a weekly basis a tractor moves around collecting the rubbish bags for disposal.

What are the classroom activities that involve solid waste?

Making musical instruments like drums and guitars with tins and plastics. Making electrical circuits with cardboard boxes. Picking up litter in the classroom. Making wheels and excels using solid waste like box of milk and lids of bottles as wheels.

How do you integrate classroom activities to outdoor activities for solid waste management?

After teaching the whole class goes outside with the teacher to check the effects of pollutions to the environment. Implement what they learnt in class by conducting a clean up campaign. Learners are requested to Design a poster showing the effects of littering. Learners pick up litter and throw it in the bins.

How do learners react to the integration of solid waste management activities?

Usually learner do not like picking papers or litter. They pick it up but they don't like it. They see it as dirty work. They stop littering by picking it up.

After implementation of solid waste management activities in the classroom, what was the effect of the lesson/s to the;

Learner:

Learners changed their attitude toward solid waste littering and it improved.

School environment:

The school environment looked neat than before.

How do other colleagues view the issue of solid waste management and explain their role?

They are in support of it

Is their participation satisfactory and why?

Yes

Why?

They are hands on.

Are there any school events that support solid waste? List them.

Yes they are school events. Launch of 'love your space campaign meant for learners to keep their space clean. Also a clean-up campaign involving the whole school in picking up litter and racking grass and leaves.

Are there any products made by solid waste at the school? Name them.

Yes. Musical instruments, like drums and guitars. Electrical circuits.

What are your suggested solid waste management initiatives?

Need for recycling bins for separation of litter. Use waste for income generation at the school. Partner with waste companies.

How do you intend to implement them?

The school should talk to waste companies to supply recycling bins so that waste can be sorted and sold.

Why is your school failing to have effective Environment Education initiatives to manage solid waste?

It takes your personal time and affects your periods which are less already. It required a teacher to be dedicated as well. Without this you cannot succeed. If all educators can pull as a team nothing is impossible. Lack of resources also hampers these programs, especially human resource and finance.

Thank you so much for participating in this study.

It is well, I appreciate your visit.

APPENDIX K: SIGNED CONSENT - TEACHER



APPENDIX F: CONSENT/ASSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, [REDACTED] (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 am prepared to participate in the study.

I understand that my participation is voluntary and that 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 that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the Interview (insert specific data collection method).

I have received a signed copy of the informed consent agreement.

Participant Name & Surname (please print)

[REDACTED]

[Signature]
Participant Signature

21/sept 2022
Date
ISIAH NYATI

Researcher's Name & Surname (please print)

[Signature]
Researcher's signature

04/07/2022
Date

APPENDIX L: PHOTOGRAPHS

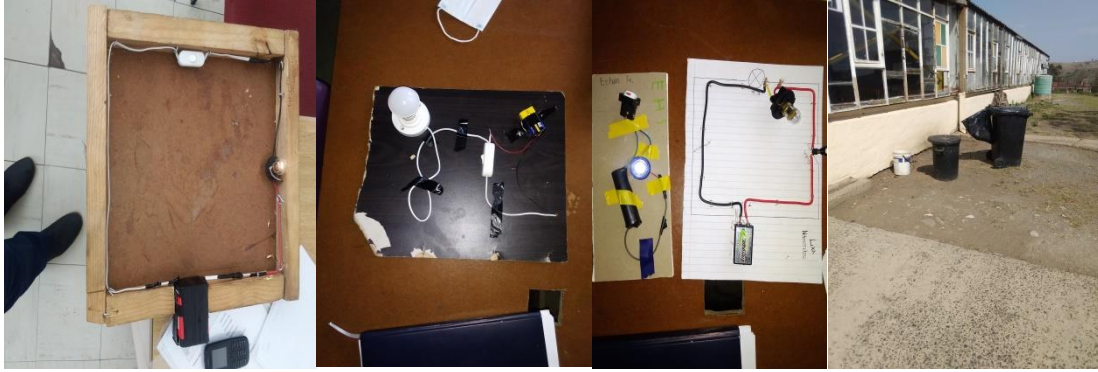


Photo 4.1 Alfa primary outdoor bins and learner projects





Photo 4.2 Block primary: Biogas system, biogas tanks underground, garbage trailer, vegetable garden, compost, burning area, outdoor bins, learners' projects and reused tins.

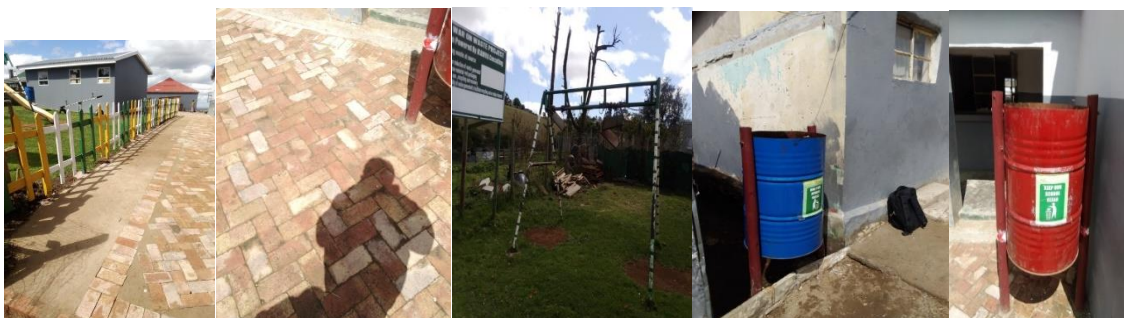




Photo 4.3 Camp primary: outdoor bins, SWM awards, wooden pallets boundary, paved pathway and learners' projects.

APPENDIX M: EDITOR'S CONFIRMATION LETTER



Kayla Gezi
Eldoraign
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Pretoria
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PRECISION EDUCATION, TECHNOLOGY AND LANGUAGE SERVICES

REVIEW REPORT

November 8, 2023

To Whom It May Concern

This letter confirms that **SOLID WASTE MANAGEMENT THROUGH ENVIRONMENTAL EDUCATION INITIATIVES: A CASE OF AMATHOLE EAST DISTRICT** by **ISIAH NYATI**, was edited by a professional language editor. The student was issued with two versions, the first version had the Track Changes, whilst the second version had all changes accepted. As the language editor, I highlighted issues on the first version of the student; this was brought to the student's attention. As the language editor, I cannot be held responsible for decisions that the student takes going forward with regard to the edits and comments supplied.

Sincerely,

Kayla Gezi

Kayla Gezi

Language Editor

PRECISION ACADEMIC AND LANGUAGE SERVICES



APPENDIX N: TURNITIN REPORT



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