THE USE OF ENVIRONMENTAL EDUCATION LEARNING SUPPORT MATERIALS IN OBE: THE CASE OF THE CREATIVE SOLUTIONS TO WASTE PROJECT

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DECLARATION

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and has not previously in its entirely or in part been submitted at any university for a degree.

Signature

18 December 2002

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ABSTRACT

The Creative Solutions to Waste Project (CSW) is a local environmental education project, involving five Grahamstown schools, the local municipality; community members and the Rhodes University Environmental Education Unit, where I worked at the time this study was undertaken. In this research I explore the use of environmental education learning support materials (LSM) in Outcomes Based Education (OBE). I have employed a participatory action research approach informed by critical theory in this case study of the Creative Solutions to Waste project (CSW). The research focused on the 'Waste Education' materials and their use, developed and piloted during the pilot phase. The Waste Education materials were also used in phase one. In phase two, the research focused on the use of 'Health and Water' learning support materials in 4 Grahamstown schools. Research participants included educators, support team members, municipal officials, Department of Education officials, Department of Health (Eastern Cape) officials, the Health Promoting Schools committee and NGO representatives. I employed a range of data collection strategies including questionnaires, observations, field notes, semi-structured interviews, focus group interviews, workshops, reflective journal, videotapes, and photographs and documents analysis. The research process was collaboratively discussed and agreed upon by all the participants. This research indicated that the purpose influences the use of LSM. It also indicated the importance of mediation processes in the use of LSM. This study indicates that the designs of LSM and particular views of learning influence the way LSM are used. It does that by looking at how an active learning framework influenced the use of learning support materials and consequent learning processes. It also highlights the significance of paying attention to issues of language and literacy in the design of LSM, and how these factors influence the use of LSM. It also identified the tension between prescriptive and open-ended processes to professional development in supporting the use of LSM in contexts of curriculum change and transformation. This study also indicated the importance of reflexive processes to improve support process in the CSW project by demonstrating how the contributions and the roles of the support team were reflexively changed. I have reviewed the research processes in relation to the research design decisions made at the start of the project. This study lastly offers some recommendations for further research into the use of LSM, and how an understanding of LSM use may influence the development of LSM.

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CHAPTER 1

OVERVIEW OF THE STUDY

1.1. Introduction

This chapter introduces the dissertation. It introduces the background of this study and serves to justify the reasons why I decided to undertake this research. I introduce the reader to the aims and objectives of this research.

This report draws from the experiences and understanding of my own as well as the collective experience of other colleagues and researchers I have worked with over the past two years. I had a rich diversity of experiences while working in this research. Those interactions provided an opportunity for me to learn and teach through exploring my role as a materials developer, teacher educator and learner.

In understanding a research project one needs to plan and get guidance. Preparing for this research process involved making decisions, designing the research and setting up strategies for doing the research. In this thesis I share some of these research design decisions, plans and strategies. I describe some of the experiences of engaging in participatory action research processes.

I have reviewed a wide collection of literature to establish the background and the context of this research, to get insights and reflections on environmental education processes, critical theory, participatory action research, the use of learning support materials (LSM) and research processes. This literature has helped me to understand the studied situations, to better interpret and engage in the processes of questioning and interpretation that are central to this research. This report highlights some of the struggles, successes and social processes involved in doing an environmental education research project. In this chapter, I start by describing the focus of this research, and I introduce the Rhodes University Environmental

Education Unit (RUEEU) which became the coordinating unit of this project. I introduce the Creative Solutions to Waste (CSW) project (a project aimed at supporting curriculum 2005) and associated learning support materials. I also provide an overview of the different chapters of this research.

1.2. Describing the research focus and objectives

McNiff *et al.* (1996:38) advise that "… as a responsible researcher, you need to be reasonably clear why you want to get involved in this issue (research question)". They further note that research is an inquiry conducted for the purpose, and the purpose being generally to contribute to advancement of knowledge (*ibid*, 13). Lotz (1996:16) also notes "…a research project cannot be conceptualised without a focus or a research question". In this study I chose to focus on the use of environmental education learning support materials in Curriculum 2005 (C2005). The choice of this research focus was influenced by different contextual and pragmatic factors (see Chapter 2). These factors also support the justifications for choosing to explore the use of learning support materials in Curriculum 2005 within a socially critical orientation to environmental education (see Chapter 2 and Chapter 3).

McNiff *et al*. (1996) further note that action research puts "I" at the centre of the research, it looks at how I improve my practice, my understanding of the issue and the wider educational situation. In crafting the research questions of this study, I had to explore the use of learning support materials to understand the issues better, but central to this was my role as a materials developer and teacher educator in the context of the Creative Solutions to Waste project (CSW). As McNiff *et al*. (*ibid*) explain, I was trying to answer the question of whether I can improve my practice. In trying to answer that question through this research one of the objectives was to look at the support processes needed by educators to optimally use learning support materials in enabling environmental learning in schools. To answer the question formulated I formulated the following objectives to guide my research. The objectives of the study are to:

- explore the ways in which educators use learning support materials (LSM) in schools;

- consider different types of LSM that are provided to support environmental learning in the context of C2005 and establish which LSM educators are using and which ones they are not using;
- establish reasons why educators are using certain LSM and not others; and
- explore the support processes required in the use of LSM in C2005.

With a view to:

- improve the learning support materials that are developed for educators,
- make recommendations on the kinds of support educators require, to be able to use learning support materials in the context of C2005,
- share the findings and recommendations with the National Environmental Education Programme stakeholders and suggest recommendations for improvement and the ongoing development of LSM (see Chapter 6).

These issues are explored in the context of the Creative Solutions to Waste project (CSW) run by Rhodes University Environmental Education. The CSW project is introduced below, following the introduction to the Rhodes University Environmental Education Unit.

1.3. The Rhodes University Environmental Education Unit

In this report I refer to the Rhodes University Environmental Education Unit as the RUEEU. The RUEEU is an environmental education unit located at Rhodes University in the Education Department. RUEEU supports the National Environmental Education Programme (NEEP) project implementation through research (Lotz-Sisitka & Raven, 2001) and has contributed to the development of learning support materials in support of environmental learning in C2005 (Schudel *et al*, 2000). At a local level, the RUEEU supports the Creative Solutions to Waste project (CSW). The RUEEU supports educators and the educator support staff to use these resources in a variety of ways.

The support team, involved in this project, was established to support educators use the LSM and implement environmental learning in C2005. The support team referred to in this report consist of Lory (who is a voluntary consultant), Glady and

Sogi (who are fieldworkers) and Shady and I (who are employees in the RUEEU). The CSW support team names used in this report are not their real names. These names are used to ensure anonymity and protection of the support team members.

1.4. A brief introduction to the Creative Solutions to Waste Project

This research report documents the use of environmental education learning support materials over a period of two years in the CSW project. This project was initiated in the year 2000, and has since grown in scale to include a materials development initiative concerned with the development of environmental education learning support materials for C2005 curriculum support in the Foundation Phase, Intermediate Phase and Senior Phase, and is described as such in this report. In this report distinctions are made between 'Waste Education' materials used during the pilot phase and phase one of the project and "Health and Water' materials used during the second phase of the project (see Appendix B) The 'Waste Education' materials contained five activities and supporting materials (see Figure 4.1). The 'Health and Water' materials contained an orientation to the resource pack, five activities for the foundation phase and five activities for the Intermediate Phase. The activities for the intermediate phase focused on water and pollution and activities for the foundation phase focused on health and hygiene issues. In each activity, there are three main sections. The front page contains an overview of the activity sheet, followed by an information section where background information is included. The third section is a reflection section (where educators reflect after each activity). For the purpose of this research report reference to the environmental education learning support materials or learning support materials (LSM) represents all the learning support materials used during this research project (see Figure 2.1, Figure 2.2 and Figure 2.3, and Appendix B).

Reference the CSW project represents all those activities and encounters that collectively contributed to the development, collation and use of environmental education learning support materials in this project since 2000.

1.5. A brief overview of the research setting

This research took place in Grahamstown in the Eastern Cape. Following the establishment of the CSW project, it was institutionalised as an environmental education project coordinated by the Rhodes University Environmental Education Unit in 2000. This research became one of the research projects that were coordinated and developed through RUEEU. The location of the research project as a university-based initiative influenced the status, possibilities and direction of the research (see Chapter 2).

It, however, tried to respond to the local issues within the community and the school context. The dominant language (in historically disadvantaged schools) is isiXhosa. The other is an Afrikaans speaking school. Most of the teachers in these schools indicated that they have never been trained in environmental education before. They have little or no training in OBE approaches. Grahamstown schools are faced with a range of environmental issues that include littering, waste and health issues, poor sanitation or no sanitation at all. All learners that participated in the CSW project use English as their second language. The dominant language in Grahamstown schools is isiXhosa. Most of the teachers that participated in the project had no prior training in OBE. Most of the teachers participating in the project were involved in upgrading their qualifications during this study (see Chapter 4).

This research is also responding the curricula issues. Following the changes in government in 1994, there have been wide ranging changes in the curriculum in the post-apartheid South Africa. The new curriculum brings about a shift from traditional objectives approaches to a system of outcomes based education (OBE). The first OBE curriculum for the General Education and Training band was named curriculum 2005 (C2005). In this new curriculum ‘environment’ was recognised as phase organiser. In a streamlined curriculum ‘environment’ will no longer be a phase organiser, but will be integral to the different learning areas of the curriculum (see section 2.4). These curricula changes call for professional development initiatives to prepare educators for their role in the new curriculum.

The research therefore took place in a context of curriculum change and transformation. The socially critical interest of this research (see Chapter 3) was therefore to contribute to change in the schools, through fostering improved use of learning support materials, and enhancing the relevance of learning through a focus on context and the environment.

1.6. Chapter outlines: A brief overview of this study

Chapter one introduces the study by describing the context of the research briefly, research questions and the research objectives. It then provides a brief overview of the study and methodology used, and the context of the research.

Chapter two reflects on the contextual influences within which this study took place. The most influential contextual dimensions of this study include.

- The state of environment in South Africa;
- The Rhodes University Environmental Education Unit;
- Establishment of the National Environmental Education Programme (NEEP); and
- Establishment of the Creative Solutions to Waste Project (CSW).

These dimensions of context all relate to change and the use of learning support materials. It is important to review them in this chapter, because it is due to the influence of these contextual factors that change and participation features strongly in choices of research focus and in the research methodology and process. This chapter provides a review of the issues associated with the use of learning support materials (LSM) in the context of C2005. It considers the implications of different research findings for this study. It also considers my role in the CSW project.

Chapter three describes the design of the study and the methodology employed. It does so through an account of the research process and the insights and decisions that shaped the final design of this study. Theory, methodology and results were not three different sections in this study, but interacting dimensions (Janse van Rensburg, 1995:31). I will thus present them as such. This chapter focuses on

broader trends and emergent reasons for decisions rather than a detailed description of the techniques and contexts. It also helps to provide a picture of how some of these methodological decisions have been implemented in the research project. It explains the action research method chosen for this study.

Durrheim (1999: 33) argues that in developing a research design, the researcher must make a series of decisions along four dimensions (see section 3.1), including the theoretical paradigm informing the research, and the research techniques employed to collect and analyse data.

Chapter 4 reports on cycles one, two and three of the action research processes and provides findings of the first, second and third cycles of inquiry. It focuses on the use of LSM in the CSW project. The first cycle of inquiry is centred on the collation, and use of the CSW pilot project learning support materials, and includes a planning, action phase and a reflection phase. The second cycle is grounded in the reflection phase of cycle one, and planning for this phase was based on the analysis of data, reflections and emerging issues from phase one. As Cohen, Manion and Morrison (2000: 228) suggest, action research uses feedback from the data in an ongoing cyclical process. The second cycle of inquiry considers the use of the CSW learning support materials; in order to inform further development of LSM and it considers the support educators' need to able to effectively use learning support materials. The third cycle of inquiry considers the use of "Health and Water" materials (new materials in CSW project) and builds on cycle one and cycle two experiences.

In **Chapter 5** I discuss the chapter 4 research findings. I have identified the following categories for discussion:

- indicators for effective use of the LSM;
- how the purpose influence the use of LSM;
- how different LSM support Curriculum;
- significance of mediation processes in the use of LSM;
- design of LSM and learning; and
- support processes, reflexivity and research.

I discussed them in relation to research findings in earlier research, as reported in Chapter two. I also reflexively review the action research processes and support processes in this chapter.

Chapter 6 summarise the study and makes recommendations that may guide LSM development and the use of learning support materials in the CSW project. The recommendations may also guide the enabling of environmental learning in C2005 more broadly and provide insight into the support processes that may be useful in supporting educators to use LSM in C2005.

1.7. Conclusion

In this chapter, I have provided a description of the research focus and objectives. I have also introduced the CSW project and have also provided a description of the research setting. This chapter also provided an overview of different chapters of this research report. I will now turn to the next chapter and reflect on the contextual influences within which the study took place. In the next chapter I also review recent research findings which document or comment on the use of LSM in supporting environmental learning.

CHAPTER 2

CONTEXT OF THE STUDY

2.1. Introduction

This chapter reflects on the contextual influences within which this study took place. Significant contextual dimensions of the study include:

- The State of Environment in South Africa;
- Policy development and environmental education processes in South Africa;
- Environment in the curriculum;
- The National Environmental Education Programme;
- Establishment of the Creative Solutions to Waste Project;
- Review of Curriculum 2005 and Learning Support Materials; and
- My role in the CSW project.

These dimensions of the context all relate to change and the educational use of learning support materials. These contextual factors have to a large extent, influenced the research design (see Chapter 3), the choice of research questions (see section 1.2.) and the research process itself (see Chapter 4). To provide insight into the significance of these contextual factors in relation to the research process, I have conducted a review of recent research which documents or comments on the use of LSM in supporting environmental learning in the context of C2005 (See section 2.7.).

2.2. The State of Environment in South Africa

A recent State of the Environment Report indicates that the 21st century is likely to be characterized by continued land degradation, decline in natural resources, increased poverty and massive over consumption of resources (RSA, 1999:39). The consumption of resources and pollution of the natural environment has been

increasing, on average by around 2% per year since 1970 (Lotz-Sisitka & Raven, 2000:1). In the State of Environment Report (RSA, 1999), it is reflected that humanity may have already exceeded the sustainable level.

In South Africa, the State of the Environment Report (RSA, 1999:18) provides insight into a series of key environment and development issues. Poverty, population growth and consequent pressures for housing, food, water and other commodities, together with the pressure for increased production, has led to the radical expansion of human settlements, cultivation and forestry mining and other industrial activities. Together these have transformed about 25% of South Africa's terrestrial habitat from their natural state (*ibid, 18*). For example, urban and industrial developments (particularly diamond mining and port development) along the coastline have transformed and severely fragmented natural coastal habitats e.g. mining waste or oil leakages from the ports. Up to 50% of South Africa's wetlands have been lost through transformation to other land uses. Industrial and agricultural activities, together with expansion of human settlements have generated large amounts of substances that are harmful to humans and ecosystem (*ibid*). The State of the Environment Report provides insight into the multi-faceted, complex nature of environmental issues and social concerns, including development and poverty (RSA, 1999). This overview presents only a brief sketch of perspectives on the state of environment in South Africa. Significant to this, is the way in which South Africa is responding to these issues. Policy development has been a key response that has opened a number of opportunities for environmental education processes.

2.3. Policy development and EE processes in South Africa

Lotz-Sisitka and Raven (2001:1) note that South Africa has a history of socially unjust conservation laws resulting from the protection of land for the benefit of the few, to the detriment of others. They *(ibid*) further note that the majority were disadvantaged in terms of access to natural resources. They were also disproportionately affected by environmental degradation such as soil erosion and water pollution, and unhealthy living areas and workplaces (Lotz-Sisitka & Raven,

2001). Overtime, however, the relationship between social justice and ecological sustainability became clearer, as did the links between sustainable development and care for natural resources (*ibid, 2*).

The year 1994 proved to be a turning point in the history of South Africa. The break from international isolation and the shift to democracy necessitated imperatives for change and social redress. South Africa's commitment to improve environmental management and environmental issues manifested itself as the government committed itself to sustainable development through the development of new policies. A key dimension of these policies is recognition of the role of environmental education processes and capacity building in addressing or responding to environmental issues.

The South African constitution guarantees that environment is a human right and states that:

> *Everyone has the right:*
>
> *(a) to an environment that is not harmful to their health or well-being; and*
> *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –*
>
> *(i) prevent pollution and ecological degradation;*
> *(ii) promote conservation; and*
> (iii) *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development (RSA, 1996: 11).*

In terms of section 8 of the Constitution, the Bill of Rights applies to all law, and binds the legislature, executive, judiciary and all organs of state. This means that government must give effect to the rights in the exercise of environmental governance. In terms of section 24 people can take legal action to protect their environmental and other rights, even where government has no obligation in terms of any other statute to give effect to these rights. Section 24 also compels government to pass reasonable legislation to protect the environment, prevent

pollution and ecological degradation, and secure sustainable development. The National Environmental Management Act (NEMA) of 1998 (RSA, 1998) represents the most important legislative measure to protect the environment. Government must also ensure compliance with legislation.

The National Environmental Management Act (RSA, 1998) commits the South African government to sustainable development. It aims to improve environmental management through a sustainable framework for the country and emphasises the need for environmental education and capacity building in all sectors of South African society. It suggests that community well-being and empowerment must be promoted through environmental education processes, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.

The White Paper on Education and Training (RSA, 1995) recognizes the need to integrate environmental education at all levels and phases of the education and training system. This White Paper on Education and Training emphasize that:

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

These policy frameworks assume that environmentally literate citizens will be able to consider the ecological sustainability of development, to actively work to reverse environmental degradation, and to manage and use the country's natural resource base more wisely and democratically. They further assume that environmentally literate citizens can use information, legislation and community action to protect and improve human and environmental health.

According to O'Donoghue (2000 cited in Lotz-Sisitka & Raven, 2001) environmental education has a key role to play in enabling citizens to improve environmental management practices in all walks of life, and to make sustainable life style choices.

Environmental education is critical to enabling learners to contribute actively and competently to sustainable development. This has been recognized in a number of international environmental initiatives, including Agenda 21, and by large international organizations such as UNESCO (DEA&T, 1998: 63). Chapter 36 of Agenda 21 highlights the need to increase people's sensitivity to, and involvement in, finding solutions to environment and development problems (*ibid*: 63). It recognizes that education can enable the development of environmental and ethical awareness, values and attitudes, the skills and behaviour needed for sustainable development *(ibid: 63).*

The role of education in achieving sustainable development has been a focus of ongoing deliberation over the past ten years, since the Rio Earth Summit in 1992. For example, the UNESCO 1997 Conference on Education for Sustainable Development held in Thessaloniki highlighted the critical role of education and public awareness in achieving sustainability (UNESCO, 2001). At the 2002 World Summit on Sustainable Development the importance of action, commitment and partnerships in education for sustainable development was emphasized at a UNESCO / Department of Education conference.

In line with these international developments, the South African Department of Education is recognizing the important role of environmental education in enabling sustainable development through a range of initiatives including national curriculum development, professional development of educators, and learning support materials development (Lotz-Sisitka & Raven, 2001, Janse van Rensburg & Lotz-Sisitka, 2001, RSA, 2002).

2.4. Environment in the Curriculum

Following the change in government in 1994, curriculum change in post-apartheid South Africa gained momentum. The National Education and Training Forum began a process of syllabus revision and subject rationalization (RSA, 2002:4). The purpose of this was to lay the foundation for a single national core syllabus. The

White Paper on Education and Training published in 1995, emphasized the need for major changes in education and training in South Africa in order to normalize and transform teaching and learning in South Africa (RSA, 1995). The White Paper on Education and Training *(ibid*, 1995) stressed the need for a shift from the traditional aims-and-objectives approach to a system of outcomes based education. A policy adopting an outcomes-based education framework required a new curriculum reflecting the principles and processes of outcomes based education. This needed to be put in place. Significant to this study was the need for new learning support materials. As a result, a new curriculum named Curriculum 2005 (C2005) was developed as part of the process of transforming education in South Africa (RSA, 1997). C2005 was developed within an outcomes-based framework and is currently being implemented in schools. Currently 'environment' is recognized as a phase organizer (RSA, 1997) in Curriculum 2005 policy to enable environmental education processes across different learning areas in Curriculum 2005. In 2000 a Ministerial Task Team reviewed Curriculum 2005 and the findings indicated that:

- There was strong support for the principles of outcomes based education and the underlying principles of the new curriculum amongst educators;
- The structure of the curriculum was skewed, and was characterized by confusion, and a lack of clarity in policy documents stemming from the structure and design flaws with integration being supported by five different curriculum features including phase organizers and programme organizers (Review Committee on Curriculum 2005, 2000 cited by Lotz-Sisitka & Raven, 2001:8)

Recommendations of the Review Committee included the rationalizing of the design features of the curriculum and improving progression, pace, and sequencing in the curriculum, as well as clearer alignment between curriculum and assessment policy (Review Committee on Curriculum 2005, 2000:42/43). It further recommended that implementation needed to be strengthened by improving educator orientation and training, learning support materials and provincial support (RSA, 2002: 5).

Significant to this research, was the recommendation to rationalize the design features of Curriculum 2005 (C2005), which involved dropping of the phase organizers, as environment was one of these phase organizers. This led to a need to reconsider environmental learning in the context of curriculum development (Lotz-Sisitka & Raven, 2001).

In June 2000, the Council of Education Ministers accepted the curriculum recommendations of the Review Committee. At this meeting, the Council of Education Ministers agreed that the Statement of the National Curriculum for R-9 should be revised in accordance with the recommendations of the Report of the Review Committee to streamline and strengthen Curriculum 2005 (RSA, 2002: 2).

While environment will no longer be a 'phase organizer' in the streamlined Curriculum 2005, the Council of Education Ministers requested that environmental education be paid special attention in the streamlining of C2005, a process that was completed in June 2002. The process of curriculum revision led to the defining of a principle statement emphasizing the relationship between human rights, a healthy environment and social justice as an integral part of all learning areas (RSA, 2002:10).

The refocusing of environment within the curriculum streamlining processes drew on research in the Learning for Sustainability Project and the NEEP-GET pilot research, which noted that:

- Environment should be viewed as integral to the learning areas to avoid the environment being viewed as an add on or extra mural activity;
- Engaging environment in the context of different learning areas requires in depth engagement with local issues, key environmental concepts and a broad perspective on environment at appropriate levels of scope and depth for different phases (Lotz-Sisitka & Raven, 2001).

In addition, Lotz-Sisitka and Raven (2001) note that environmental education has been recognized as an important facet of environmental management by other

government ministries. For example, the Department of Environmental Affairs and Tourism (DEA&T) have a dedicated environmental education unit that contributes to environmental education curriculum and policy development, environmental Standards Generating for Education and Training, 'Clean and Green' campaigns and waste education programmes, youth projects, and environmental education for business and industry amongst others. The Department of Water Affairs and Forestry (DWAF) supports a number of education projects including the 20/20 Vision Project (now called the Water Education Project), school Greening Projects and a Cholera Education Project. These initiatives constitute important partnerships for the Department of Education in providing environmental education to schools (*ibid*).

2.5. The National Environmental Education Programme

South Africa is a relatively new democratic country, and consequently many of its policies are in a state of flux. Many issues are arising as educators attempt to implement curriculum and other policies. In an attempt to support policy implementation and environmental learning, the Ministry of Education established the National Environmental Education Programme (NEEP) in 1999. The NEEP is a donor-funded project of the National Department of Education. It focuses on the General Education and Training (GET) band of the South African education system. It thus works to support educators to implement the environmental focus of C2005 within South African schools through professional development, curriculum development, materials development and improved coordination of school-based implementation (Ministry of Energy & Environment/DANCED, 2000).

In preparation for the broader roll-out of the NEEP-GET, a pilot project was run in 2001, to interface with the Grades 4 and 8 Curriculum 2005 programmes. A key aspect of this pilot was recognition of the importance of learning support materials and a resource-based approach to implementing the NEEP, in line with Department of Education (DoE) policy (RSA, 1997). This pilot was undertaken in 6 provinces concentrating on the use of learning support materials and a research-based approach to professional development (Lotz-Sisitka & Raven, 2001). The NEEP-

GET project was preceded by the Learning for Sustainability Project (LFS) that piloted environmental education with educators and focused on school-based environmental education curriculum development, innovations in environmental education, as well as an appropriate professional development model (Janse van Rensburg & Lotz-Sisitka, 2000).

The findings of these two research initiatives informed the establishment of the Creative Solutions Waste (CSW) project in Grahamstown, and subsequently this research (see sections *2.7, 2.7.1, 2.7.2, 2.6.1)*

2.6. Establishment of the Creative Solutions to Waste Project

One of the important functions of the NEEP-GET project is to strengthen and develop partnerships (Ministry of Energy & Environment/DANCED, 2000). The NEEP-GET project recognizes that implementing environmental education at a national level is not something that can be done by one organization alone. The NEEP-GET interacts with partners in two ways: interaction through environmental education fora and through working with partners to run environmental education professional development clusters. The project has structures that enable stakeholders to take part in the project activities. One such structure is a reference group that enables broader consultation on issues affecting the environment in the curriculum. It also serves as a forum for coordination between stakeholders in environmental education at a national level, and advises the NEEP-GET steering committee. The second opportunity for interaction is in the provincial forums. In provinces where such forums exist, the project staff will take part in those forums, and where they do not exist, the project staff have established them. It was envisaged that the largest part of collaboration amongst the partner groups would be around the development of learning support materials (*ibid)*.

The Rhodes University Environmental Education Unit (RUEEU) supports the National Environmental Education Programme (NEEP-GET) project through research and evaluation (Lotz-Sisitka & Raven, 2001, Lotz-Sisitka, 2002) and the

development of learning support materials (Schudel *et al*, 2000). It also contributes to environmental learning locally, and to the integrated development plans in the Grahamstown district.

As a partner group working with the NEEP-GET, the RUEEU initiated and supported the Creative Solutions to Waste project (CSW), which involves development of different learning support materials and curriculum development processes to enable educators to use learning support materials (LSM) within the context of Outcomes-Based Education (OBE). The Rhodes University Environmental Education Unit initiated this project in partnership with the Grahamstown Transitional Local Council and two local people with an interest in waste education and management. The RUEEU supported educators and the educator support staff to use these learning support materials in a variety of ways over a period of three years (1999-2001). The CSW project was designed to be 'aligned' with the National Environmental Education Programme (shortly after the pilot project), which includes:

- a research based approach to implementation;
- resource based approaches to learning;
- partnership orientations;
- active learning through OBE (Lotz-Sisitka & Raven, 2001, Department of Energy & Environment/DANCED, 2000); and the
- the professional development of educators.

The CSW project aimed to build capacity amongst local educators in the Grahamstown area to implement environmental learning processes. This involved:

- implementation and development of school environmental policies;
- supporting educators to design learning activities, adapt and use learning support materials to enable environmental learning in different learning areas;
- supporting the development of fieldwork or excursions linked to the learning programmes;
- reporting the project outputs at the provincial NEEP-GET Forum; and

- participatory development and trialling of environmental learning support materials for the Foundation, Intermediate, and Senior phases by educators, municipality officers, and some of the CSW support team members.

It is this last objective that provided the impetus for this research (see section 1.2.).

2.6.1. A focus on the use of LSM in Curriculum 2005

As noted above, the last objective provided the impetus for this research. The reason I decided to explore the use of learning support materials, and to focus on the **use** of learning support materials in the CSW project is influenced by my role in both the CSW project and the NEEP-GET projects. As an employee in RUEEU, I conducted research and evaluation of the CSW project in partnership with the CSW support team and educators involved. I also took part in the collation and development of learning support materials, curriculum development and I supported educators to implement the project activities and use the LSM through workshops and meetings. I also provided support to the fieldworkers. At a national level, I provided research support to the NEEP-GET pilot project, and have contributed to LSM development.

I envisaged that, through this research, the CSW support team and I would be able to support educators to use learning support materials. We also anticipated that together with local educators we might be able to develop learning support materials (LSM) that were responsive to the needs of the learners (as articulated by educators) and that we would adapt learning support materials to suit their needs. The main focus of this research was the learning support materials used by the CSW project at a local level. The focus of this research was also influenced by a number of studies that indicated the need for research on the use of learning support materials (see section 2.7). These included the learning for Sustainability Project (LFS) evaluation, the NEEP-GET pilot research project and President Education Initiative (PEI) studies amongst others. For example, the NEEP-GET pilot research (Lotz-Sisitka & Raven, 2001:53) indicates that the reasons for limited use of LSM were not explored in the NEEP-GET pilot project, and it is

recommended that this aspect warrants further research. In several studies conducted by the Presidents Education Initiative (PEI), it has also been unveiled that in some cases educators do not use learning resources (Vinjevold, 1999:183) and a recommendation is made for further research to understand why educators do not use textbooks when they are available (Vinjevold, 1999:184) (see review of these studies below in section 2.7). These issues influenced the focus of this research (see Chapter 1).

2.6.2. Perspectives influencing LSM development in the CSW Project

In dealing with environmental issues in curriculum development it would seem necessary to recognize that through language and interactions societies have come up with different understandings of 'environment' over time (RU/SADC Core Texts, 2000). It would also seem important to recognize the complex nature of environmental issues (Lotz-Sisitka & Raven, 2001). Environmental issues often involve biophysical, social, economic and political dimensions (O'Donoghue, 1993). This broad based perspective on environment, and recognition of the complexity of environmental issues have influenced and guided the work of the NEEP-GET project and CSW learning support materials. For example, the CSW waste learning support materials look at environmental health issues, the politics of waste collection in Grahamstown, potential economic uses of waste and its relevance to address social issues.

Perspectives on environmental education processes also influenced the CSW project. O'Donoghue (2001) notes that present perspectives of the environment and diverse notions of education for sustainability developed in response to emerging socio-ecological risks. These encompass a wide range of teaching and learning strategies. O'Donoghue (2001: 5) further notes that:

> "… all are centred on activities involving contextual social processes of cultural induction and critical reflexive re-orientation within important and open-ended educational processes for sustainable human interaction in a healthy, just, and equitable environment".

The NEEP-GET pilot project developed an open-ended framework to guide environmental education processes amongst educators and learners (Lotz-Sisitka & Raven, 2001:31). The CSW project drew on this open-ended framework as an orientating framework to guide the design of the LSM. According to Lotz-Sisitka & Raven (2001), the intention of this open-ended framework was to provide scaffolding and guidelines for facilitating and assessing active learning in OBE, in line with the Minister of Education's *Tirisano* campaign, which aims to encourage active learning through OBE; school community links and professional development of educators (DoE, 1999 cited in Lotz-Sisitka & Raven, 2001).

The framework recognizes "…the importance of paying attention to a balance of educational processes of cultural induction, encounter experiences and critical reflection" (O'Donoghue, 2001: 5). According to O'Donoghue (*ibid*), a balanced mix of environmental education processes that enables learners to find information 'about' issues, explore these through experiences 'in' the environment and take action 'for' a better world, contributes to meaningful environmental learning and to better environmental management and lifestyle choices. Taylor and Russo (2002:40) note that this open process orientation has been both relevant and meaningful. To provide orientation to educators in planning environmental education processes of active learning and social change, and as a guide to learning processes, a series of steering questions were developed as part of the open ended 'Active Learning Framework' (Schudel *et al*, 2000). O'Donoghue (2001: 9) referred to these as " … common sense questions", and notes that they provide a scaffolding to foster learner enquiry and problem solving (see Figure 2.1.).

During initial application of the active learning framework in the context of the NEEP-GET pilot project, the framework was refined and improved, to enable educators to plan for environmental education processes in the context of the OBE curriculum framework (see Figure 2.4.).

Lotz-Sisitka and Raven (2001:32) highlight the key improvements to the active learning framework as researched in the context of the NEEP-GET pilot project. These included:

- A deeper understanding of processes of mobilizing prior knowledge and experience;
- Clarification that the focus of a unit of work or illustrative learning programme could be an environmental issue, risk or concern;
- 'Tuning' in activities enabling the mobilizing of prior knowledge and experience;
- 'Concluding connections' activities to enable summative assessment of learning outcomes as well as assessment of environmental management and lifestyle choices; and
- Reporting activities that could be used in combination with information seeking activities, enquiry encounters and action taking activities (Lotz-Sisitka & Raven, 2001:32)

This framework influenced the design of the CSW learning support materials. For example, the learning programmes were designed in such a way that they encouraged active learning. In introducing the activities, the learning programme encourages educators to draw on learners' prior knowledge and build on it. It includes a section that encourages learners to explore and question (referred to as finding out). It furthermore encourages the learners to take action to address environmental issues and also encourages them to report to their fellow learners and parents. The active learning dimensions are reflected in the learning programme below (see table 2.1). Learning support materials for each of these active learning processes were included.

Table 2.1: Example of a learning programme on waste from the CSW Foundation Phase pack

ACTIVITY	**RESOURCES**
1. **Introductory "Tuning In"** • Before your lesson, ask learners to bring in a CLEAN bag of things that have been thrown away in their homes. • Ask learners to form groups with their collection of rubbish. In order to establish what learners know about waste, select a few items and ask learners: What it is, where it comes from, what it was used for and what will	• Learners' prior knowledge • Collection of waste • Large sheets of paper • glue • pens

happen to it (whether it will break down). • In their groups learners can sort their waste into glass, plastic, metal, paper and other. This waste can be stuck onto a large sheet of paper and labelled.	
2. Finding Out – Explore and Question • Divide the class into paper, glass, plastic, metal and 'other' groups. Ask them to go onto the school grounds and collect as much of their particular type of waste as they can. • Ask learners to count how many items of their particular waste were collected. Draw this up in the form of a class list. *Remember to wash hands after this activity!* • Discuss the results: Why is there more of one type of waste than the other? • What are some of the environmental problems or dangers associated with waste? (Use 'Wise up on Waste' – pg. 5 to facilitate this discussion)	• plastic bags to collect waste in • Wise up on Waste – pg. 5
3. **Taking Action** • Before this activity, ask learners to bring sticks, wire, string, scrap material and wool to school. • In groups, ask learners to make "Waste People" out of these items and the litter they collected the previous week. These can be waste pictures (stuck onto paper) or waste sculptures. Each "Waste Person" should be given a name. • Follow this up by asking learners what else can be made from the types of waste they have collected. This will be a discussion on re-using. Re-cycling can also be introduced here (use the Waste Pack Activity Sheets and DSW Fact Sheets for information).	• string • glue • paint + paint brushes • containers for mixing paint (you could use cleaned out containers collected during the last activity!) • masking tape • Waste Pack Activity Sheets (Glass, Paper, Metal): • DSW Fact Sheets (Glass Recycling, Paper Recycling, Metal Recycling, Plastic Recycling) • Wise up on Waste pg 21-23
4. Reporting • In groups, ask learners to decide what character their "Waste person" will be. Work with the learners to create a class play about the environmental problems and dangers of waste (refer to Activity 2) • If there is time, learners can design creative invitations out of waste to invite people to the performance of their play.	
5. Reporting • Learners present their play to other classes or to their parents. • Facilitate a discussion with the learners and the audience about what they have learned about waste.	
6. Taking Action – Extra Activity • Demonstrate to learners how they can make table tennis bats and balls out of waste.	• Materials for bats and balls • Description + diagrams of how to make bats and balls

Later in the CSW project, the new learning support materials took a different design. The 'Health and Water' resource pack for foundation phase learners has been

developed in support of the Health Promoting Schools Project in collaboration with local Grahamstown educators and the Rhodes University Environmental Education Unit. This collaborative effort has been driven by the close connection between environmental and health issues which need to be addressed in the Grahamstown community and a need for learners to become actively involved in addressing and responding to these issues. As noted above, an active learning framework centres around a specific focus, which may be any issue, risk or concern of relevance to the learners' everyday lives. Active learning processes start with the mobilising of prior knowledge and experience. Learners' prior knowledge and experience can be mobilised through brainstorming of ideas, developing of mind maps, guided questioning or open discussion. From this, a range of different activities can be planned and enacted with learners. These activities may involve any sequence of information sharing, enquiry encounters, and action taking and reporting (O'Donoghue, 2001).

The design of the new CSW learning support materials included an activity page (see Figure 2.1 below), an information sheet (see Figure 2.2) and a reflection page (see Figure 2.3). These changes recognise that an important part of any learning programme is reflection on the activities conducted, the resource materials used, and the learning outcomes achieved by the learners. This intends supporting the improvement of the learning programme and the LSM the next time it is implemented. The reflection page contains space for educators to reflect on the activities and learning support materials. Reflective questions are included to help educators in this reflection: What went well? What could be improved on? Have you any suggestions for changes for next time?

Figure 2.1: Structure of the activity sheet

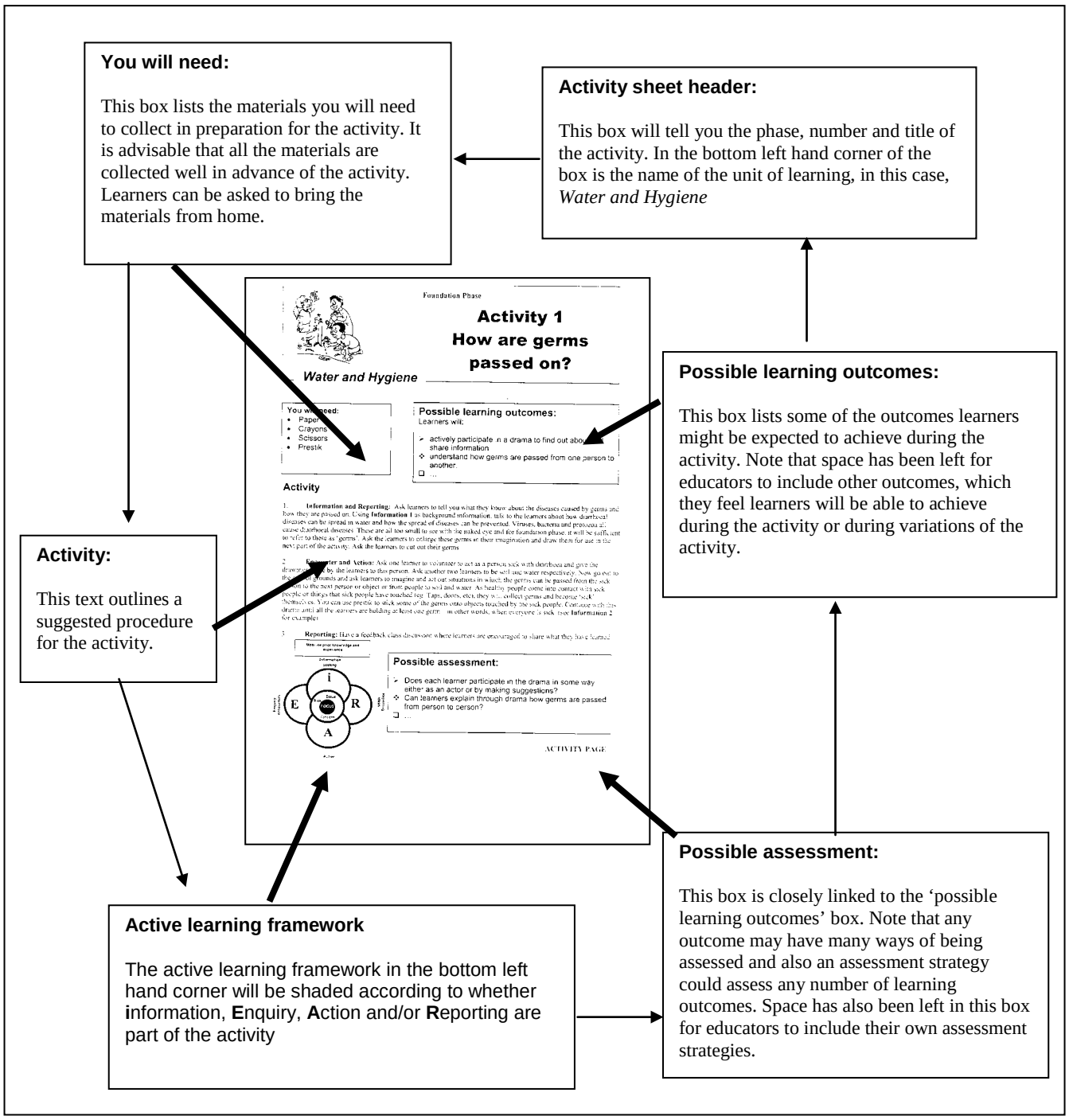
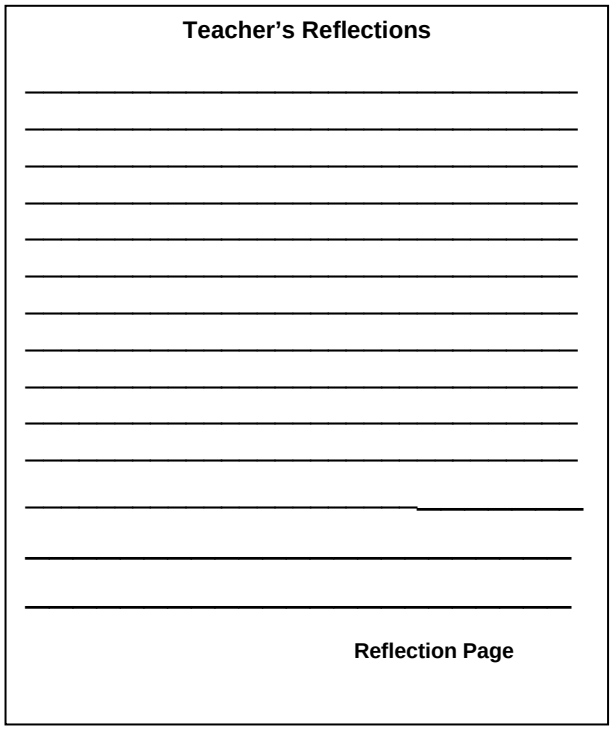


Figure2.2: Information Page

Figure2.3: Reflection Page



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From the above, it is clear that ongoing developments and research in the field of environmental education curriculum development and environmental learning (particularly as these relate to the NEEP-GET project) have influenced the CSW project. These changes influenced the later version of the CSW materials, for example the "Health and Water" learning support materials. I now turn to a discussion on learning support materials and learning, as this emerged as an important dimension of the use of LSM (following deliberations on the active learning framework described above).

2.6.3. Learning support materials and learning

Scott (2002: 19) notes that "…the quality of learning materials and learning experiences are critically dependent on the application of pedagogically sound theories of learning and teaching…". Moll (2002), commenting on learning theory informing the implementation of OBE, notes that the Department of Education has started to look explicitly toward constructivism to provide the teaching and learning solutions called for by Outcomes-Based Education in South Africa. Constructivists

(Western Cape Department of Education, 2000) recognize learners' prior knowledge in learning. This comes from the understanding that learners are not empty vessels, as they come to a learning experience they bring knowledge and experience with them (Capel, Leask & Turner, 1995:214). Ausubel (1968:36 cited in Capel, Leask & Turner, 1995:216) note that "…the most important single factor influencing learning is what the learner already knows, ascertain this and teach him accordingly". In the active learning processes described in section 2.6.2 above, consideration of what learners already know (prior knowledge) is part of the open ended processes that orientated the design and the use of LSM in the CSW project. In constructivist pedagogy, learning is contextually embedded; it begins with what learners bring to the situation (Capel, Leask & Turner, 1995). The active learning framework encourages the mobilization of prior knowledge and learners' experience (see Figure 2.4 below). For example in the CSW Foundation phase learning programme we provided a suggestion to encourage the educator to ask the learners to work in groups and collect rubbish and we provided questions that teachers could ask learners to mobilise their prior knowledge about the waste they collected (see Table 2.1).

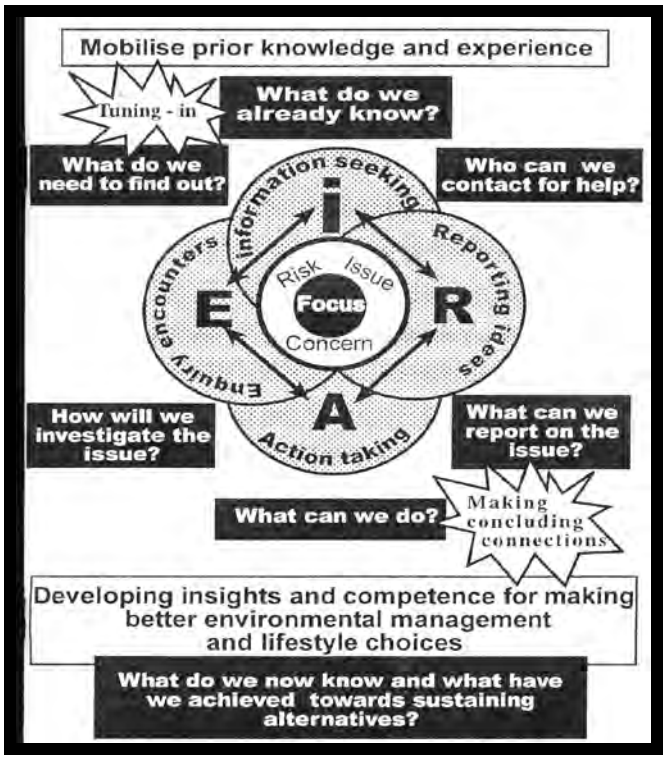


Figure 2.4: The active learning framework as refined after the NEEP-GET pilot research (O'Donoghue, 2001).

Constructivism and OBE both stress the importance of active learners. They stress that the development of effective student action in relation to knowledge must be the primary aim of teaching/learning (*ibid,* 120).

One of the principles of constructivist learning theories is that learning takes place in contexts relevant to the learner (Semple, 2000: 5; Western Cape Department of Education, 2000). I have recognized that the design and use of learning support materials is influenced by the broader socio-cultural context including beliefs about, and evidence of how children learn (*ibid*). In designing the CSW LSM we took into consideration the principles governing C2005; and we were informed by social constructivism as a theory of learning (Moll, 2002). Social constructionists (McMahon, 1997; Capel, Leask & Turner, 1995:222) argue for knowledge construction processes to be active and they note that knowledge should be constructed in a meaningful context through active learning processes. Social constructivist (McMahon, 1997: 4; Packer & Goicoechea, 2000) referred this type of learning as situated learning. The concept of 'situated learning' indicates that knowledge must be situated in a relevant context. Implications of this for the design and use of the CSW learning support materials included a consideration for the context in which the LSM were going to be used. Thus the CSW tried to integrate the school and community context through a process of collaborative materials development and by using ideas and pictures taken from Grahamstown that reflected the context in which learning was happening. We encouraged the use of LSM to explore issues in the learners' local context. For example, waste issues emerged from the community context and the school learning programmes were aimed at responding to these local issues. In the second phase, the CSW project responded to needs around health and water in response to contextual issues in Grahamstown and learning materials were developed (see Appendix B).

Social constructivist learning theories stress the need for collaboration amongst learners (Capel *et al*, 1995: 220). The implications for this in terms of the design and use of learning support materials were to design the activities in such a way that they encouraged collaboration and recognised the role of the educator in mediating

learning for the learners. This enabled social processes of communication and negotiation among learners, and this in turn acknowledges that knowledge or learning is the product of social processes (*ibid*).

Vygotsky introduced the concept of a 'zone of proximal development' (Capel *et al*, 1995: 220). This concept refers to the gap between what an individual learner can do alone or without the help of a teacher and what they can achieve with the help and instruction of a more knowledgeable person (*ibid*, 220). The Vygotskian concept of the 'Zone of Proximal Development' suggests that through a process of scaffolding a learner can be able to do what he would have not been able to do without the help of a 'significant other'. This implied that educators encourage learners to use their prior knowledge and demonstrate what they are able to do, and the teacher could then challenge learners to increased levels in terms of scope and depth in a particular grade by either asking questions that could help learners expand their knowledge of the topic and or by referring them to, and encouraging creative use of LSM that could increase learners' level of understanding. In the CSW LSM, the learning activities are designed to encourage learners to become actively engaged in a learning process, by starting challenges to establish what learners already know. Through the scaffolding questions, the CSW LSM enabled learners to undertake further investigations and share information with others who might be more knowledgeable than the learner. This could increase learners' levels of understanding, beyond their existing levels of understanding (evident at the start of a learning process).

McMahon (1997) emphasises the importance of scaffolding and acknowledges the mediation role of the educator that is required in the learning process (and in the use of learning support materials) to achieve the necessary learning outcomes. The significance of the educators' mediation role has become evident in the findings of this study (see Chapters 4, 5 and 6). McMahon (*ibid*) defines scaffolding as an interactive process in which adults adjust both the amount and type of support they offer the child, eventually leading to mastery of skills being taught. In designing the

learning programme unit we provided activities that encourage group work among the learners.

As noted above, it has been useful to scope some of the current thinking associated with learning, and the relationship between learning theory and LSM. In the next section, I provide insight into a range of research projects which have attempted to explore the issue of how LSM are used to support / mediate and enhance learning.

2.7. A review of research findings on the use of LSM

This section will provide an in-depth review of research findings on the use of LSM. In a search for literature in the use of LSM, I have found that the use of learning support materials in OBE appears to be under-researched. I have found it very difficult to find relevant literature. I have, however, gained some insight from the studies reviewed below. In this section I am therefore reviewing the NEEP-GET pilot project research findings, LFS project findings, DoE research findings and other relevant studies.

2.7.1. NEEP-GET pilot research: Findings on the use of LSM in South African schools

In line with the National Environmental Education Project for General Education and Training (NEEP-GET) initiatives, the CSW project emphasized the importance of learning support materials in fostering or enhancing environmental learning. Educators and other research participants were exposed to environmental education learning support materials that are likely to foster environmental learning in schools. The selection, development and adaptation of LSM to suit contexts in which educators work to broaden their knowledge and experience of environmental issues is highlighted.

In the NEEP-GET pilot project, Lotz-Sisitka and Raven (2001: 47) note that educators were positive about the provision of learning support materials, and felt

that LSM provided practical ideas for implementing outcomes based learning programmes in their school context, and for enabling environmental learning among learners. They (*ibid*) further note that "… it [the LSM] proved to be important in supporting professional development processes with educators". They (*ibid*) note that the LSM and their use in professional development workshops appear to have enabled a better understanding of the environment, environmental education processes and integration of an environmental focus in the curriculum.

Lotz-Sisitka and Raven (*ibid*, 53) note further that one of the findings of the NEEP-GET pilot research indicates that educators are generally inclined to use 'easy' materials, i.e. materials which do not require much reading or further research. They (*ibid*) argue that this may be related to issues of language in learning; and to issues of preparation; time; and lack of clarity on the required levels of scope and depth, particularly in the senior phase. Reasons for the limited use of LSM were not explored during the pilot research project. They (*ibid*, 53), however, note that some researchers identified issues of difficulty in language and a strong reliance on the textbook as the reasons for limited use of LSM. They note, for example,

> *… one possible reason cited by the Western Cape researcher was the difficulty in language given that the schools with whom he worked were Afrikaans medium schools…The KwaZulu-Natal researcher similarly notes that … learners battled with language used in the resource material in the NEEP-GET pack (ibid, 53).*
>
> *In KwaZulu-Natal and the Free State, researchers report that educators, working with senior phase learners, referred learners to the textbook as the main source of information. Similarly, the North West Province researcher notes a limited use of resource materials and note that'…the principal of the school still regards the textbook as the main source of information* (*ibid*).

They (*ibid*, 55) note that the relevance of the information in the textbooks to the environmental learning foci of the NEEP-GET pilot project was not established in the research, and suggest that this warrants further research.

This research study indicated that poorly resourced schools did not have access to many environmental education (EE) resource materials other than items in the local

environment (such as water, trees, waste, schoolyard and others) and that "… it is however, not only the accessibility of learning support materials, but educators' and learners' ability to use learning support materials and the difficulty of providing accessible, adequate LSM in 11 official languages that are causes for concern" *(ibid, 47*). This research further indicated that educators lack experience in working with resource based approaches to learning.

2.7.2. The Learning for Sustainability Project: Findings on the use of LSM in South African schools

The LFS research findings indicated that contextualised approaches to curriculum development require a flexible range of LSM that can be selected and adapted for use in local context (Lotz-Sisitka & Olivier, 2000). In the Learning for Sustainability project, Louw (*pers com*. in Janse van Rensburg & Lotz-Sisitka, 2000) reflects that educators seemed to be anxious about the resources required for curriculum development work (Janse van Rensburg & Lotz-Sisitka, 2000:90). Louw also notes that some educators collected a range of resources for their learning programme units (LPUs), but seemed to be unable to find ways of developing learning activities using these resources. In these cases resources were used as display materials. In another instance observed in Mpumalanga, educators appeared to have little experience in finding information from a range of resource materials.

The LFS project indicated that an educator requires adequate conceptual capital, relevant local knowledge, access to, and the capacity to use learning support materials (Lotz-Sisitka & Olivier, 2000: 85). Lotz-Sisitka and Olivier (*ibid)* further note that educators also need relevant learning area knowledge and expertise for the design of learning programmes at a local level.

Lotz-Sisitka and Olivier (*ibid, 100)* notes that an integrated approach to professional development, materials and curriculum development seems to have been what was neglected, while emphasis has been placed on establishing a model of professional development. These findings emphasise the role of LSM in enabling educational

transformation, and make the point that LSM alone will not make a difference. It is the integrated approach to curriculum materials and professional development that is significant.

2.7.3. Department of Education Research: Findings on the use of LSM in South African schools

The DoE regards adequate LSM as essential to the effective running of an education system and asserts that these materials are an 'integral part of curriculum development' and 'a means of promoting good teaching and learning' (RSA, 1997:1). Czerniewicz *et al* (2000), however, notes that there is a general lack of clarity and consistency with regard to the nature and role of LSM in the new curriculum, and similar confusion as to the responsibilities of the different role players in terms of producing the LSM. The DoE developed basic principles that should inform the development of learning support materials. According to these principles, learning support materials should:

- Promote life long learning;
- Promote critical thinking, logical reasoning, and problem solving skills as essential life skills;
- Promote emotional, intellectual, personal, physical, spiritual, moral and social development, gender appropriateness and sensitivity, and an integrated approach to learning and encourage 'hands on' experiences;
- Promote awareness and respect for the environment and the diverse cultural heritage of society at large;
- Provide for continuous progression of opportunities for development allowing learners opportunities for development, and opportunities for gradual refinement of perceptions;
- Take cognisance of individual differences and promote learner paced learning; and
- Link content, concepts, attitudes and norms (Vinjevold, 1999: 164).

The introduction of C2005 has emphasized the importance of resources in the design of the curriculum. The approach is referred to as “resource based learning/ teaching” (DoE, 2001b: 5). At present there are imbalances and wide disparities in teaching practices between the well resourced and the under-resourced schools. Access to resources, such as libraries and computer technology, bring the well-resourced schools closer to the practices advocated by C2005 while under-resourced schools are disadvantaged (*ibid, 5*). The DoE notes that educators’ competency in the use of LSM and the unavailability of resources in most schools has implications for the successful implementation of National Curriculum Statements (DoE, 2001b: 6). Czerniewicz *et al.* (2000) caution that the supply of LSM is not enough in itself. They therefore note that the supply needs to be accompanied by professional development that enables educators to understand the pedagogical approaches underpinning the LSM. The Curriculum Review indicates that there is a strong alignment between the curriculum framework, teacher development, and the development and supply of LSM (Review Committee on Curriculum 2005, 2000).

According to the report of the Review Committee on Curriculum 2005 (Review Committee, 2000), several submissions expressed concern about the quality of material used in the implementation of Curriculum 2005. The new textbooks are described as “woolly” or “quite superficial” (Review Committee on Curriculum 2005, 2000: 62). According to this review (*ibid*) there is a need for continuous review of learning support materials to improve the quality of teaching and learning in the education system. As a response to the Curriculum 2005 Review, the National Curriculum Statement Ministerial Project Committee recommended that LSM should serve the function of capacity building with regard to implementing the curriculum effectively and informing and developing educators with regards to the implementation of the National Curriculum Statements (NCS) (DoE, 2001b: 6).

In several studies conducted by the President Education Initiative (PEI), it has also been unveiled that in some cases educators do not use learning resources (Vinjevold, 1999:183) and a recommendation is made for further research to

understand why educators do not use textbooks when they are available (Vinjevold, 1999:184). PEI findings (Vinjevold, 1999: 163) indicate that textbooks were available at the schools in their studies although they were not sufficient for all learners. For example, in Schollar's study (*ibid*) of four EQUIP schools in Mamelodi, all pupils had textbooks and stationery from GDE, but the principal reported that there had not been sufficient books for all learners. Vinjevold notes that, in another study in the Free State, the Human Sciences Research Council (HSRC) discovered that two to five of the twelve schools did not have textbooks in some subjects for particular grades. The majority had some textbooks, but not enough for all the learners (*ibid*, 170). In a study examining the amount and nature of learning resources available in Grades 1 and 7, Baxen and Green *(ibid*) note that where materials were present, they were perceived by educators to be insufficient and of a poor condition (*ibid, 172*). The Baxen and Green study further indicates that urban under-resourced schools were significantly short of reading materials, and rural schools had no learning materials in sufficient quantity (*ibid*).

The next significant finding in the PEI research report is that even though LSM are available some educators do not issue them. For example, in one of the PEI research projects, in the study of teaching of Geography in eight schools in the Free State. Pile and Smythe (cited Vinjevold, 1999:170) found that all schools had sets of classroom textbooks but educators had not issued them or used them with learners (Vinjevold, 1999:171).

The PEI research provided some insights into the use of LSM. For example, Wickham and Versveld's (*ibid*) classroom observations were directed at the use of learning support materials. Vinjevold (*ibid*) notes that the main finding of Wickham and Versveld's research is that "…individual educator rather than the materials used is the significant determinant in the materials/ practice relationship". Their reports claims that educators use textbooks in terms of their established practice rather than according to material developers intentions (*ibid*, 171). Vinjevold notes that this study does not describe the practice in detail (*ibid*).

From the PEI research project, it appeared that LSM were used differently and for different reasons. Baxen and Green (cited in Vinjevold, *1999:* 172) found that in Grade 1 classes the emphasis when using materials was on 'getting things right' and completing the task rather than understanding. In Grade 7 educators use learning materials primarily by manipulating and handling them themselves while learners watched. This study reports different ways in which LSM are used, for example, in some cases learners were given materials and general instructions on how to interact with them. In one case materials and guidance were given before learners were left to solve a problem. Learners were seldom encouraged to use materials as a resource for independent learning or reading (*ibid*, 173). These findings indirectly point to the importance of the educator's role in supporting the use of learning support materials.

Another important finding of the Baxen and Green research (*ibid*) is that Grade 1 educators did not have an understanding of the relationship between learning support materials and learning goals. Grade 7 educators had a clear understanding of the relationship between learning outcomes and learning support materials used (i*bid*, 172/3). Vinjevold notes that Grade 7 educators' better understanding of the relationship between the learning outcomes and learning support materials, might be because they were subject specialists and had a better conceptual understanding of the subject (*ibid*, 173). This implies that educators' understanding of the subject or learning area may have an implication for the way they use learning support materials. It also points out that if educators have a better conceptual understanding of their subject they would be able to understand the relationship between learning outcomes and learning materials. Baxen and Green further note that although learning support materials used were generally appropriate, they (LSM) were only used to access existing knowledge on the topic and not to develop conceptual understanding (*ibid,* 173).

In some of the PEI studies, the relationship between learning support materials and learning in the classroom is observed. The PEI studies indicate that where LSM are used, learning is learner-centred, and where there were inadequate LSM, teaching

is inevitably educator centred. Onwu (cited in Vinjevold, 1999) examined the availability and use of science materials in ten Grade 12 classes in the Northern Province. S/he (Onwu) notes that the extent to which methods were educator centred or learner centred was strongly influenced by the existence of textbooks, writing materials, writing books and teaching aids (*ibid*, 175). Onwu further notes that where learning materials and facilities are inadequate, the teaching approach is inevitably educator centred, and that the availability of textbooks and materials also resulted in an increase in the number of distinct activities in the lesson (*ibid*, 176). However, Onwu cautions that the LSM are necessary but not a sufficient condition for learner centred teaching and learning and the existence of textbooks and science materials did not necessarily result in learner-centred activities or pupil achievement (*ibid*). He points out that this happened when there is a motivated and qualified educator. Vinjevold (*ibid*) notes that Onwu did not elaborate on this. However, significant to the point raised by Onwu, is that educators' abilities and qualifications are important for better use of LSM.

Some of the PEI research studies also indicated a number of reasons as to why educators are not using the LSM. The reasons included outdated textbooks, difficulty in reading LSM, educators limited knowledge of the subject, educators and learners language competences, non-alignment of the LSM to the curriculum, educators perceptions of the LSM and quality (*ibid*, 176-179). For example, the Pile and Smith study (cited in Vinjevold, 1999) indicates that educators said they did not use textbooks because they were outdated and too difficult for the pupils to read on their own. Macdonald and Langhan (cited in Vinjevold, 1999) found that the low level of language competence among pupils meant that they found textbooks too difficult to read (*ibid*, 176). They (*ibid*) found that educators had poor levels of reading competence, and that caused misunderstanding of texts and an inability to interpret maps and signs. Smith notes that educator's subject knowledge; reading levels and language competence might not allow them to access textbooks.

The above perspectives and findings from the DoE research influenced this research and the focus of this study on the use of LSM needed to foster environmental learning in the context of the CSW project (see sections 2.6.1, 2.7.5).

2.7.4. Other research findings on the use of LSM in South African schools

Among other studies I have reviewed, is Lotz's (1996) PhD dissertation on participatory materials development and a study undertaken by Murray and Wilmot (2000) focusing on the Namibian Life Science material.

In the Lotz (1996) study, it appears that purpose influenced the way educators used learning support materials. Her study indicated that educators used learning support materials to support the curriculum and to support their lesson planning. Her study further indicated that educators used LSM as a support for reflection and action to change their daily planning. She notes that the We Care Primary Pilot materials support environmental education curriculum development work *(ibid*, 164). Lotz notes that the LSM were used by educators to enhance their capacity to engage with the inclusion of environmental issues (Lotz, 1996: 159), and that the LSM in the We Care Project were successfully used with Grade 1, Grade 2 and Grade 3 classes (*ibid*, 159). However this study did not indicate whether educators and learners used the LSM or whether the LSM were used only by educators. Lotz (*ibid*, 160) further notes that materials were used successfully when educators adapted them for different grades.

In this study the use of We Care Primary Pilot activities in the classroom highlighted practical problems relating to 'hands on' work with large groups, and that "…being interested in materials and liking the ideas does not necessarily influence classroom teaching and learning methodologies supported by the nature of the materials". She sees this as resulting from a lack of exposure to the active learning methodologies proposed in the materials (*ibid*, 184) illuminating lack of active learning pedagogy in schools. She (*ibid*) therefore recognizes that we need to empower educators to use

materials confidently and flexibly, and proposes this as a condition for using materials that support methodologies that are new and unfamiliar to educators.

In the context of the CSW project, we intended the use of learning support materials to bring about social change, and thus chose an action research design for the project (see Chapter 3). Lotz (1996) however, cautions that it is not materials that bring about change but rather the quality of interaction around the materials. Taylor (cited in Lotz, 1996:5) describes the focus on materials to bring about change as a myth that is prevalent in environmental education. He notes that while materials may be able support better education processes, as technologies (they) can never direct social change.

Beside Lotz's insights on the use of LSM (*ibid*), a study conducted by Murray and Wilmot (2000) provided further useful insights into the use of LSM. Their study also indicates that the purpose influences the use of LSM. Educators in this study used learning support materials to plan their lessons and to find answers from the textbook. Learners also used learning support materials to retrieve information. Educators adapted information from the LSM to plan their lessons. They indicated that educators used LSM to support curriculum development and as a resource to teach content. They note in this study that the syllabus affects the way LSM are used, they therefore suggest a fit between the textbook and syllabus curriculum.

This study also indicated that learners have difficulty in using learning support materials because of the language used in the LSM, the design of LSM and the literacy level of learners. Learning support materials in this context were written in English in the context where the primary language of both educators and learners is not English. They further noted that simplifying language did not help, and they therefore saw the use of transcoding (use of pictures, drawing and labelling) to develop conceptual understanding as a better way of improving the situation. They indicated that for effective use of LSM, the educator's mediation role is important (Murray & Wilmot, 2000: 14) and the educator's scaffolding role is needed.

2.7.5. Implications of the research findings for this research

All of the above studies have indicated the importance of learning support materials to support curriculum. Considering that the CSW aimed at supporting the curriculum work in terms of integrating environmental education in the curriculum, learning support materials had to be developed to support this process. The LSM also had to be recognised as an important part of the curriculum.

The findings of the above research projects had many implications for this study. They influenced the focus, the development and the use of learning support materials in the CSW project**.** These studies indicated the need for further research on the use of learning support materials. For example, the NEEP-GET pilot (Lotz-Sisitka & Raven, 2001: 53) research indicates that the reasons for the limited use of LSM were not explored in the NEEP-GET pilot project, and therefore recommend that this aspect warrants further research. In several studies conducted by the Presidents Education Initiative (PEI) (Vinjevold, 1999:183) recommendations are made for further research to understand why educators do not use textbooks when they are available (Vinjevold, 1999:184) (see review of these studies above). Because of the findings of these studies and my role in both the NEEP-GET pilot project, and the CSW project I chose the use of learning support materials as the focus of this study. This study aimed at answering some of the questions raised in the research findings reported above, for example the reasons why educators are not using learning support materials or why they are using LSM (see section 2.6.1 and Chapter 4).

In some of these studies, there is an indication that educator participation in the selection; development and adaptation of LSM enhanced the use of learning support materials (Lotz-Sisitka & Raven, 2001; Lotz, 1996). In terms of the CSW project, this implied that we needed to provide an opportunity for educators to participate in the selection and development of the LSM. We needed to recognise that while educators might participate in the selection and development of learning support materials, the LSM might not be relevant enough for individual schools, so the

educator would be expected to be able to adapt the learning support materials to meet the schools context and the specific needs of the learners.

In some of these studies, it is indicated that use of second language has affected the use of LSM. This implied that as we used the LSM in the CSW project, we needed to consider that learners using learning support materials are second language speakers. For successful use of LSM, we were hoping that the educator would mediate learning and we considered the educators role in observing the use of the LSM. In order to enhance the design and use of the learning support materials we tried to take into consideration the language of learning and the primary language used by most of the learners (isiXhosa). This also formed part of our observations.

In both the NEEP-GET and LFS studies, it is noted that LSM were also used in educator professional development and have been a useful support for professional development. The implications of these findings were that in the CSW project, we needed to use the LSM for teacher professional development. We therefore included the active learning framework and learning programmes as a way of encouraging educators to make the links between learning outcomes and assessment (see section 2.6).

Another issue that emerged in the studies reported above, was the issue of the literacy level of educators and consequent implications for the use of learning support materials. To respond to this we worked with a group of educators to collectively collate and develop the learning support materials in the CSW project. We were hoping that through educator participation they would get a chance to familiarise themselves with the LSM and as they engaged with other educators they would develop competencies to assess the relevant information. In the NEEP-GET research it also appeared that educators did not use LSM because they were unsure of the required scope and depth expected in each Grade. As we worked on the CSW learning support materials, we tried to interpret the assessment

requirements for the different phases (which indicate scope and depth), and we developed packs for each phase with a clear progression framework.

The PEI studies list principles for the development of learning support materials. Noting that these principles were defined by the DoE to guide learning support materials development in South African schools, we tried to ensure that the CSW learning support materials would comply with these principles (see section 2.7.3).

2.8. Conclusion

This chapter reflects on the contextual influences within which this study took place. These included the state of environment in South Africa, policy development and environmental education processes, integration of environment into the curriculum, the National Environmental Education Programme, and the establishment of the CSW project. To provide more perspective on this research, I have reviewed the Curriculum 2005 Review report. The state of environment report provided some insights into environment and development issues. The review of environmental policies like NEMA, the White Paper on Education and Training (RSA, 1995 and 1998) indicated the significance recognising environmental education processes as a response to environmental issues. I reviewed issues on curriculum change and the introduction of outcomes based education.

Recognising that the NEEP-GET advocates a resource based learning approach (in line with the DoE policy), I have discussed the establishment of the CSW and its alignment with the NEEP-GET processes.

I have also reviewed different research projects, the findings which have influenced this study, these include among others, The NEEP-GET pilot research, Department of Education PEI studies, Learning for Sustainability research findings, the We Care Primary research findings and the Namibian Life Science Project Learning Support Materials evaluation report (see 2.7. above). Having reviewed and discussed these contextual issues and the research findings, and their significance for the CSW

project, I will discuss the research design decisions made in this study in the next chapter.

CHAPTER 3

RESEARCH PROCESS AND METHODOLOGY

3.1. Introduction

This chapter describes the design of the study and the methodology employed. It does so through an account of the research process and the insights and decisions that shaped the final design of this study. Theory, methodology and results were not three different sections in this study, but interacting dimensions (Janse van Rensburg, 1995:31). I will thus present them as such. This chapter focuses on broader trends and emergent reasons for decisions rather than a detailed description of the techniques. It also helps to provide a picture of how some of these methodological decisions have been implemented in the research project.

Durrheim (1999: 33) argues that in developing a research design, the researcher must make a series of decisions along four dimensions. These include:

- The purpose of the research (see Chapter 1 and Chapter 2);
- The theoretical paradigm informing the research (see section 3.2.);
- The context or situation within which the research is carried out (see Chapter 2 and Chapter 4); and
- Research techniques employed to collect and analyse data (see section 3.3.).

3.2. Research design decisions

3.2.1. Deciding on the methodology

Making decisions on the research methodology was influenced by ontological and epistemological assumptions that were, in turn, influenced by a number of factors. In framing the research methodology, I considered the following features of the research process in relation to the CSW project objectives and processes:

- A research process that would contribute to my professional development, educators' professional development and the professional development of the support team;
- A research process that is respectful of human dignity and which is grounded in democratic values;
- A research process that would provide space for educators to research their own practice through reflecting on it; and
- A research a process that would allow educators and the CSW support team to improve their practice.

3.2.2. Theoretical framework informing the research

This study employed participatory action research as a research approach (Bhana, 1999; McNicoll, 1999; McTaggart, 1997; Schroeder, 1997); informed by critical theory. Cohen, Manion and Morrison (2000) cite a range of research approaches or methodologies available for social situations. They *(ibid)* provide a framework for decision making, and guiding the choice of research methodology. They agree that the ontological and epistemological assumptions[1] that researchers hold have direct implications for the methodological concerns of researchers. It was my belief that this study should be responsive to the curriculum issues and problems within the contexts in which they are taking place (see Chapter 2 and Chapter 4). I also believed that research should encourage participation of those who are directly involved in the research process because

[1] Ontology represents a particular view of reality held about the situation in question, and epistemology represents a particular view of the nature of knowledge. Whereas ontological assumptions concern the nature of reality, epistemology relates to how such assumptions can be known (Cohen, Manion & Morrison, 2000).

that could develop a sense of ownership among research participants. That, I hoped, might result in developing a sense of responsibility that could contribute to change and curriculum implementation (see section 2.7.).

Lotz (1996: 39) argued that environmental education seen from the socially critical perspective can become a responsive process of addressing environmental issues and problems from within the school environment, made possible through active participation and ongoing reflection-in-action by educators and students. Thus, the research process was aimed at supporting a socially critical orientation to curriculum development. Lotz (*ibid*), however, argues that this approach has limitations, particularly if narrowly applied.

The assumptions and perspectives of critical theory (Lotz, 1996: 266; Carr & Kemmis, 1986: 131; Fien, 1993:6; Walker, 1997: 155) were used as an orienting theoretical framework for this study/research. The ontological assumptions of critical theory are that there are multiple realities, which may be distorted through communication (Connole, 1993) and critical theory assumes that all reality is socially constructed (Berger & Luckman, 1967 cited in Prasad & Caproni, 1997; Cohen, Manion & Morrison, 2000: 29). According to Prasad and Caproni (1997), this implies that societal members continually create, reinforce, and revise reality through social negotiation and collective assignment and reassignment of meaning.

Epistemologically, critical theory sees knowledge as dialectical and notes that knowledge is not value neutral (Connole, 1993: 23). This implies that knowledge always represents certain interests. Critical theory is committed to understanding any particular social or organizational phenomenon (e.g. the use of LSM) with respect to its multiple interconnections and its location within holistic, historical contexts (Prasad & Caproni, 1997: 285). Prasad and Caproni (1997) refer to this

as the principle of totality[2]. The principle of totality implies that environmental education processes cannot be fully understood without locating them within a broader historical context. Similarly the use of LSM cannot be fully understood without an understanding of the historical context of schooling, teaching and learning (refer to Chapter 2 and Chapter 4).

The principle of totality implies an understanding of environmental education processes as cultural and social practices, influenced by intra-organisational forces as well as by the broader ideologies and material conditions for a particular society. This calls for socio-historical analysis of the education system in South Africa and in schools (see Chapter 2).

Critical theorists seek to understand human experience as a means of changing the world. Kincheloe and McLaren (1994 cited in DePoy *et al*, 1999: 561) note that the common purpose of a researcher who approaches investigation through critical theory is therefore to come to know about human experience to promote social change. This is in line with my research objectives, which involve exploring the way educators use learning support materials, and to improve the support provided to educators for the use of learning support materials (see section 1.2.).

With the focus on social change, critical theorists view knowledge as power and production of knowledge as 'socially and historically determined' (DePoy & Hartman, 1999:561). DePoy and Hartman (*ibid*) further argue that derived from this view is an epistemology that upholds pluralism or in which coming to know about the phenomena occurs in multiple ways. Knowing is thus seen as dynamic, changing, and influenced by socio-political context.

[2] The totality principle 'expresses a commitment to study social arrangements as complex, interrelated wholes of partially autonomous parts (and)…directs us to see the intricate ties of organisations to the larger society—not only to macro structural features such as economics and political systems but also to the everyday activities of people (Benson, 1997 pp. 4-9, cited in Prasad & Caproni, 1997:286).

Blyler (1998: 36) notes that critical theory aims at empowerment and emancipation. Blyler (*ibid*, 6) argues further that critical researchers believe that examining ideological domination is essential if empowerment and emancipation are to occur. As I engaged in critical action research processes in this study, I hoped that I would be able to empower educators to be able to use environmental education LSM to their maximum potential and enable them to participate in materials development. I also hoped that through my interaction with the educators, I would be empowered in my role as materials developer and teacher educator involved in educator professional development. I have not uncritically adopted the notion of 'empowerment' and I have (like Ellsworth, 1989: 306) recognized the paradoxical assumptions of empowerment that assume that I have power and educators don't, and that I am able to give them power. In this context I believed that I would contribute to educators' professional development through professional interactions with them. In the same context I recognized that I would be learning with educators and would therefore also be empowered. I therefore use the term empowerment as a way of looking at the research process as an empowering open-ended process, rather than an individualizing crusade aimed at empowering others.

Prasad and Caproni (1997:287) see ideology as a shared worldview, and they note that although ideology provides order and meaning for societal members, it also prevents individuals from living fulfilling lives by masking social contradictions, creating false expectations, and thus limiting societal possibilities and human potential. In the context of the CSW project I have noted that educators may not be confident or free enough to participate in curriculum and materials development processes (see Chapter 2, 4 and 5). This is partly the result of the history of domination and subjugation in the South African education context that disabled educators from participating in curriculum or materials development. I felt that I needed to work within a theoretical framework that challenges these ideologies, and their impact on the system.

Critical theory is committed to praxis, the ongoing construction of social arrangements that are conducive to the flourishing of the human condition (*Ibid*, 287). This implies a combination of the awareness gained from ideological critique with reflective strategies for social change, thus transforming critical theory into an inspiring and constructive springboard for action. Prasad and Caproni therefore argue that, on account of this commitment to praxis, those who employ critical theory must go beyond challenging social realities, identifying ideological issues, and unmasking systems of domination (*ibid*, 287). Given the history of ideological domination in education in South Africa (see Chapter 2; Jansen & Christie, 1999), I wanted to engage in critical research that would, I believe, provide an opportunity for educators and the support team to critique the *status quo*, and through this take informed action to bring about change in classrooms.

3.2.3. Participatory action research

As noted above, participatory action research was used as the research approach in the CSW project. Guevara (1996: 24) notes that participatory research has its roots in action research. DePoy, Hartman and Haslett (1999) note that action research and critical theory are not mutually exclusive and thus their philosophical foundations are complementary. They both value grassroots approaches to identifying and resolving social problems, democratic perspectives and social change outcomes. McKernan (1991:5) notes that the

> "…rationale for action research rests, initially, on three pillars: first that natural settings are best studied and researched by those participants experiencing the problem; second, that behaviour is highly influenced by naturalistic surroundings in which it occurs; and third, that qualitative methodologies are best suited for researching naturalistic settings (*ibid*)".

3.2.3.1 Bridging the divide between research and practice

The focus on action, improving practice and social change introduces a research methodology that bridges the divide between research and practice (Somekh, 1995); a methodological orientation that is viewed as appropriate for this study. Somekh *(ibid*) further argues that it directly addresses the knotty problem of the persistent failure of research in social sciences to make a difference in terms of bringing about action improvements in practice. In action research, the process of research and action are integrated**.**

In line with the theoretical framework of this research, the findings are fed back into the practice with the aim of bringing about social change (see Chapter 4). This argument is strengthened by McNicoll (1999:2), who observes that participatory action research leads directly to action because it arouses the motivation of those involved. McNicoll (1999) further argues that participatory action research sets in motion a permanent process of reflection that leads to subsequent and continuous actions. This has been evident in the CSW project research, as reflected in Chapter 4.

3.2.3.2 Action research cycles

Having noted that participatory action research has its roots in action research, a process involving a spiral of steps composed of planning, acting, observing and evaluating the results of a particular action (McTaggart, 1991 cited in Guevera, 1996:27) was followed in this study. Action research involved recurrent cycles of three main phases. There is a planning phase, in which practitioners identify areas for improvement in their practice and educational activities are identified where improvement is deemed possible. In the action phase, the plan is to put actions into practice in an educational setting. During this phase, the practitioners should find ways of monitoring the action. The means of monitoring should provide insight into the practice, which, in turn, informs the reflective phase. During the reflective phase, information collected during the planning and action phase is examined and analysed. Robottom (1987a, 109 cited in Lotz, 1996)

notes that it is important for practitioners to reflect critically on the relationship between their practice (the monitored action) and their subjective view of what is being practiced (the personal theory that guides their practice). After due consideration of the emerging findings of the three phase action cycle, the next phase is entered. Action research is therefore mediated by praxis: by practitioners' critical reflection upon their professional activities (ibid, 86).

These recurrent cycles of the three phases form the action research spiral, in which knowledge from one cycle informs the strategic action of the next cycle (Carr & Kemmis, 1986). Robottom (1987a: 111 cited in Lotz, 1996) supports this argument by stating that

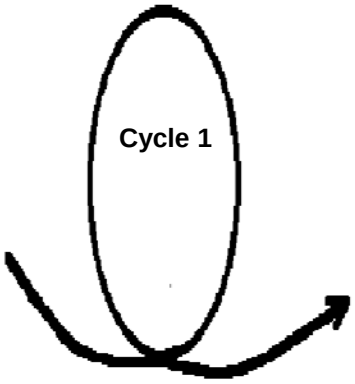
> *… it is the action research spiral of successive cycles, rather than a single cycle of three phases that allows improvement and rationality and justice of the practice itself, of the practitioners' understanding of the practice and of the practitioners' understanding of the situation in which the practices are carried out.*

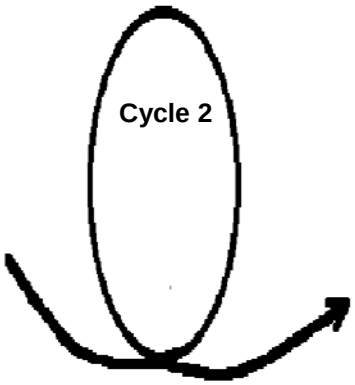
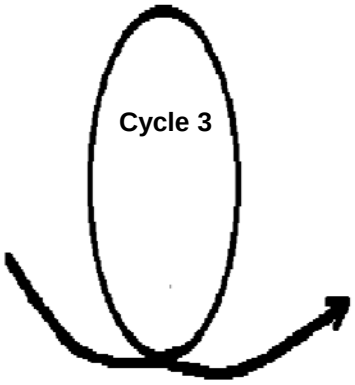
This study represents three cycles of enquiry in an action research process to explore the use of environmental education learning support materials and the related support processes that educators needed to optimally use the environmental education LSM (see Chapter 4).

The first cycle of enquiry is centred on the use of the CSW project waste learning support materials during the pilot phase of the project and includes a planning, action phase and reflection phase. The second cycle of enquiry is grounded in the reflection phase of cycle one, and planning for this phase was based on the analysis of data, reflections and emerging issues from phase one. The second cycle of enquiry took place during the phase one implementation of the Creative Solutions to Waste Project (CSW). The second cycle of inquiry reviewed the waste LSM used during the pilot phase of the project and explored the use of environmental education LSM as a way of informing further development and use of environmental education learning support materials.

The third cycle of inquiry is grounded in the reflection phase of cycle 1 and cycle 2. Planning for this phase was based on the analysis of data, reflections and emerging issues identified in cycle one and cycle two and participation in a community based meeting which provided more insights into water and health issues. This meeting influenced the main focus of the learning support materials in this phase. Like Lotz (1996) I have noted that action research cycles of inquiry provide an open-ended, emergent framework for restructuring emerging, democratic and action based participatory research projects, and thus provided an appropriate framework for the CSW project activities. The following table represents different CSW project activities and research processes in the context of the different cycles of inquiry (see Table 3.1).

Table 3.1: Cycles of inquiry in the CSW Project

Cycles of inquiry	**Project Activities and research processes**
 **Pilot Phase: Waste materials developed, Jan-June 2000**	**Cycle 1 of Inquiry** • Development of LSM and curriculum (learning programme) • Use of LSM and evaluation **Use of LSM** • Information, research, planning • Support team use of LSM instead of educators • Lack of infrastructure like photocopies could affect the use of LSM **Research Process** • Need to incorporate participants' perspectives • Redesigning the questionnaire • To review the evaluation method **Further Issues/ question to Probe/Research** • Why certain LSM and not others • Lack of insight into which LSM were useful, and which one were not, to probe that further and redesign the questionnaires • Lack of insight into why not use of LSM, where LSM were not used

 **Phase 1:** **Waste materials redeveloped** **January - September 2001**	**Cycle 1 of Inquiry** • Development of LSM and curriculum • Review of CSW LSM • Use of LSM and evaluation **Use of LSM** • Information, research, planning • LSM mainly used by educators than learners • Lack of infrastructure like photocopies could affect the use of LSM **Research Process** • Use of the same reflective schedule by support team members and educators • Redesigning the questionnaire • To review the evaluation method **Further Issues/ question to Probe/Research** • Lack of insights on the effective use of LSM, to be addressed by looking at the learning outcomes, and the mediation role of the educator in relation to LSM • One educators difficulty in completing the educator reflective schedule, re-strategize by using interviews and reflection on LSM instead of educator reflective schedule on the next cycle of inquiry • Use ALF as biblical,
 **Phase 2:** **'Health and Water' LSM developed,** **September - December 2002**	**Cycle 3 of Inquiry** • Development of LSM and curriculum • Use of LSM and evaluation **Use of LSM** • Information, planning, ask questions as put in LSM • Simple, linked to OBE, easy, relevant, simple language, availability • Irrelevant, literacy, illegibility, length of information sheets **Research Process** • Educator reflection section on LSM, individual interviews • Fieldworker reflection schedule • Overlaps of cycles of inquiry • Norms and standards mediation roles **Further Issues/ question to Probe/Research** • Need to develop Senior phase LSM • Lack Activity progression in different Phases

3.2.3.3 Action research and participation

In line with the theoretical framework of this study, I wanted to employ research processes that are grounded in democratic values and provide the space for participation in the CSW project research process (see 3.2.1.).

Given the socio-political shifts towards democracy and social change in South Africa (Lotz, 1996: 37), and the development of participatory, people centred approaches to environmental issues (Ramphele, 1991 cited in Lotz, 1996: 37), I believed participatory action research is appropriate for this study. The demise of apartheid in 1994 was heralded nationally and internationally as a victory for democracy and human rights. It offered unique opportunities and responsibilities to reconstruct a fragmented and deeply discriminatory education system, and establish a unified national system underpinned by democracy, equity, redress, transparency and participation (RSA, 1997) and the values entrenched in the South African Constitution (RSA, 1996).

Underpinning action research is a set of democratic values, which endows the action researchers with the right to take control of research process and make decisions about a full range of methodological issues on the basis of careful ongoing reflection, judgement and contextual knowledge. McNicoll (1999) notes that research participants are involved in different stages of the research project, which include education, reflection, research and action.

According to Kemmis (1993 cited in Bryant, 1996: 110), action research is a form of research carried out by practitioners into their own practices; and it is a participatory form of educational research for educational improvement.

Hart (1993:110) notes that ‘activist’ forms of research (including action research ”…cannot be other than participatory research, requiring collaborative enquiry as a means of educational reconstruction. McNicoll (1999:2), quoting from the literature, notes that:

> *“PAR has the power to revolutionalize the way social scientists do research, that is, by working “with and for people rather than on people” (Reason, 1988). It has been linked to empowerment and social awareness, counter hegemonic practice (Hall, 1993) and the breaking of the “academy of monopoly” on knowledge production (Hall, 1979; Hall, Gillette, & Tnadon, 1982)”.*

According to Park (1993:1, cited in McNoll, 1999:1) participatory action research puts "… research capabilities in the hands of the deprived and disenfranchised so that they can transform their lives for themselves". This was of particular significance to this study because the majority of South Africa educators have been disenfranchised to contribute to curriculum development decision-making processes by oppressive apartheid policies. These authoritarian policies did not enable educators to select and use a diverse range of learning support materials (see section 2.7.). They were mostly confined to the use of prescriptive, often biased textbooks that in themselves represented authoritarian views of knowledge. In this context I see myself not as an expert, but a co-learner who shares my research skills and also recognises and benefits from the skills and knowledge of the other group members (McNoll, 1999) involved in the CSW project.

In the opinion of Hart (1993:114) and McKernan (1996:120) a study employing action research leading to collaborative actions is necessary for the support and impetus required to seriously and systematically exploring practice and professional problems. Groups can provide many perspectives, and through a collaborative action research process these groups can be encouraged to develop increased flexibility in thinking about issues and concerns, to be more receptive to new ideas, and to address problems more divergently (Hart, 1993:114).

According to Noffke and Zeichner (1987 cited in Hart, 1993: 144), participatory action research has been associated with an increased sense of professionalism in terms of increasing feelings of self worth and confidence, increasing awareness of personal beliefs, assumptions, biases and predispositions; increasing congruence of beliefs (personal theories of action) and practices (personal actions) (see also McTaggart, 1997: 35; McKernan, 1996: 30). It is also associated with a broadening of educators' views on schooling, education, and

society (Hart, 1993: 114), thus enabling educators to improve their professional practice. It is my belief that research must empower all participants in the research. In case of the CSW project, this involved the researcher (myself), the support team and the educators involved in the research. In designing this research, I have sought to provide an enabling orientation with the focus on the involvement of educators in the use of environmental education learning support materials, curriculum and learning support materials development, review and improvement of LSM, and evaluation of LSM, as part of processes of democratisation, empowerment and change (see also Lotz, 1996: 84).

Kemmis (1982: 43 cited in Lotz, 1996:84) notes, however that "… action research should not be seen as a recipe for bringing about democracy, but rather as an embodiment of democratic principles in research".

3.2.3.4 Educators as researchers

In line with the theoretical framework informing this research, I employed a research process that sees educators as co-researchers in the research process. Leading from the belief that the participant is best placed to conduct inquiry into pressing professional problems, it follows that practitioners must engage in curriculum inquiry to improve their art and practice. Research in this view is a form of self-critical inquiry (McKernan, 1991: 5). Citing McNiff *et al.* (1996), Pereira (1999) further argues that action research is a form of reflexive practitioner research done by individuals on and in their own practice, with the objective of professional development. Onwuegbuzie (1997) argues that classroom research or educator research has often been undertaken by professional researchers, not by educators in their own practice. He, citing Kelly (1985) and Ruddick (1985), argues that this trend has initiated and increased the gap between theory and practice, with educators believing research has little relevance to practice.

In the CSW project, educators had an important role as researchers (Flake, Kihs, Donnelly & Ebert, 1995 cited in Onwuegbuzie, 1997:1) (see Chapter 4). According to Flakes *et al.* (*ibid*, 2), by becoming researchers, educators are better equipped to take control of their classrooms and professional lives, helping them to broaden their views on teaching (Nokkfe & Zeichner, 1987 cited Hart, 1993), thus playing a role in bringing about the necessary change from within.

Action research also assumes that if educators work together on a common problem, clarifying and negotiating ideas and concerns, they will be more likely to change attitudes and behaviours, if their own research indicates that it is necessary (Hart, 1993:114). One of the most important features of action research is reflection, and according to Schön (1987) systematic reflection is an effective way for practitioners to learn. Based on my observations, I found the reflective moments very useful to learn new things from colleagues and other participants (see Chapter 4). In particular the collaborative reflections of and with educators provided useful insights for all involved in the CSW project. Creating the spaces for educator reflections, and the processes required to monitor the ongoing cycles of planning, acting and reflection in the CSW project, required the use of diverse research techniques.

3.3. Data collection methods

In this participatory action research process described above, I used the following techniques for data collection:

- Participant observation;
- Informal discussions;
- Focus group interviews;
- Field notes;
- Reflective journals;
- Documents analysis (evaluation report, minutes of meetings, curriculum documents, LSM and learners work);

- Questionnaires;
- Workshops;
- Video tapes; and
- Photographs.

I discuss each of these techniques briefly, to provide insight into the way in which the techniques were used to collect data in the context of the participatory action research process.

3.3.1. Participant observation

In this research we employed participant observations as the main data collection technique. Participant observation is a method used in qualitative research, where the investigator typically has regular sustained contact with a group of people in their natural setting, observes and participates in their activities, and records as much of what occurs as possible (Muller, 1995: 65). Muller (*ibid*) further argues that participant observation emphasize "…social interaction between the researcher and informants in the milieu of the latter, during which data are systematically and unobtrusively collected".

The support team and I felt that participant observations would be an appropriate strategy for data collection in this research. We believed there would be several advantages to using this research strategy. The research would take place while working with educators in their natural settings (classrooms). In cycle one of inquiry, we used an observation and evaluation schedule (see appendix A1) to document our observations, and during cycle two and cycle three of this inquiry, the support team and I used fieldworker reflection (see Appendix A8) to complement our observations. The observations helped us document interactions as educators went about their formal and informal discussions, and

their interaction with the support team, learners and other educators. As the focus of the research was on the use of learning support materials, we needed to observe how educators were using the environmental education LSM. This required a focus on what they were actually doing with the LSM.

Observations also helped us to understand the socio-cultural and historical context of the CSW project, particularly in so far as these factors influence the use of environmental education learning support materials. For example, language used in the classroom, educator-learner interaction, classroom conditions, and educator-support team interactions were observed (see Chapter 4). Participant observations, according to Muller (1995:66), emphasize the importance of the context in answering questions.

3.3.2. Informal discussions and field notes

In this research, I used informal discussions as a way of collecting data because I realized that as I talked to the educators, many insights were gained into the use of LSM, particularly educators' views on the LSM and reasons why they selected some LSM and why they chose to use them in particular ways.

And as I talked to educators and other research participants I kept field notes, documenting my own reflections, as well as the 'snippets of conversations' that provided useful insights into the research questions.

3.3.3. Interviews and focus group interviews

During the first cycle of inquiry (see Chapter 4), I tried to organise a series of focus group interviews. I, however, experienced a number of problems in setting up these focus group interviews, and this strategy was therefore not successful.

During the second phase of the project (cycle 3 of inquiry), I decided to use individual interviews and I used the questions prepared for the focus group interviews (see appendix A3) to probe for answers. These were easier to arrange and I found that educators were prepared to engage in open discussion on the project, and I therefore used semi-structured interviews. Lotz (1996: 96) notes that semi-structured interviews allow for both responding to predetermined questions and free responses. She further notes that in action research the function of interviews is largely to elicit responses relating to experiences of events within an overall strategy of multiple data sources and triangulation. These interviews were conducted with the educators involved in the CSW project. Interviews enabled me to probe for explanations and clarity where I felt there was a need (see appendix A3). I recorded the interviews and transcribed the tapes. The transcriptions of the interviews were sent to the support team members and to the educators for validation and further comments where relevant.

3.3.4. Reflective journals

I encouraged the use of reflective journals (see appendix 10) to document all activities and experiences relating to the project activities. Elliot (1991b:77 cited in Lotz, 1996: 92) recommends that such a journal

> "… s*hould contain personal accounts of observations, feelings, reactions, interpretations, reflections, hunches, hypothesis, and explanations. Accounts should not merely report bald facts of the situation, but convey a feeling of what is like to be there participating in it".*

In this research the support team and I designed reflection journals to be completed by all members of the support team. The support team members could not complete their reflective journals and it therefore did not become that

useful in this research. I, however, kept on documenting my experiences and activities relating to the project in my research journal, and I found this a useful source of data.

3.3.5. Documents analysis (progress reports by fieldworkers, minutes of meetings, LSM and learners work)

I also used document analysis as a data collection strategy. For example in this project, the fieldworkers had to write two reports in each phase of the project. Those reports became a useful source of data, and provided insights into the use of LSM and the context of the research. I used the reports to gain some insight into the use of LSM and also as way of documenting the research process. Minutes of the support team meetings became an important source of data and mostly documented the data analysis and reflective moments of the research. These minutes captured our collective reflections on the project as a whole, and on participatory action research experiences. They also documented project plans and issues. LSM reflection section in the phase two of CSW project provided further insight into the use of LSM and learners work was used as evidence of learners learning outcomes.

3.3.6. Questionnaires

During the reflection phase of cycle one of the inquiry, and following the failure of the focus group interviews, the one research participant that made it to the focus group meeting, the support team and I discussed the need for a questionnaire to be completed by educators. While questionnaires are often associated with positivist orientations to research (which is not in line with my research orientations), the idea of using questionnaires was the product of negotiation and discussion among the research participants. We also used the questionnaires during the second phase materials development workshop to obtain further

insights (see appendix A5, A4 and appendix A6). We also used a teacher and school profile questionnaire (adapted from the NEEP-GET pilot research questionnaire) (see Appendix A7) during the first phase of the CSW project to document contextual issues that could affect the use of LSM. Irwin (2001) notes that using questionnaires has a number of advantages that include reaching a number of respondents at low cost. He (*ibid*) further notes that questionnaires place an emphasis on writing rather than verbal skills. He notes that this might both be an advantage and disadvantage. While he recognizes the advantage of using questionnaires, he notes that there may be little or no opportunity for respondents to clarify questions they are not certain of or to ask questions of their own. During the first cycle reflection phase and during the second phase workshop on the review of the project, and the development of new LSM, educators completed the questionnaire. During the second cycle of inquiry, educators completed the teacher reflection sheets (see Appendix A9).

3.3.7. Workshops

Like Lotz (1996), I approached the use of workshops as a research opportunity in which I, together with the educators and other research participants, could reflect on the use of LSM, review LSM, develop LSM, plan and reflect on the research process. Workshops were an important component of the action research process, as they were focused on the action and reflection component of the participatory action research process. They provided a forum for collaboration, necessary in participatory action research processes. After each workshop the output was a set of draft learning support materials that we refined into final learning support materials to be used by educators (see Appendix B for full set of the final materials developed in phase one and phase two of the research). Other issues that emerged during the workshops are documented in the reflection sections of this research report (see Chapter 4).

3.3.8. Photographs and video recorder

I also used photographs as a data collection strategy. McNiff *et al.* (1996: 103) note that photography is an increasingly popular method within action research. During the pilot phase and phase one of the project all educators were given disposable cameras to document their experiences. The support team also took some photographs of the events taking place. Support team members were also given disposable cameras to take photographs during their visits to schools. Educators managed to take photographs of the excursions and classroom activities. The support team managed to take photographs of the excursions, classroom activities, meetings and workshops.

McNiff *et al.* (1996: 103) further note that photographs can show the quality of children's engagement in the activity. In this context photographs were important to show the quality of engagement of educators in the workshop, and their engagement in the use of LSM. They also became useful to show learners engagement in the classroom as the educator used LSM (see Figures 4.1, 4.2, 4.3, 4.4, Figures 5.1, 5.2, 5.3).

Photographs can also be used for stimulated recall (*ibid*, 103). In the context of the CSW project some photographs were used as part of the classroom activities, and they were used to get learners to talk about environmental issues in their context, and became a useful resource for teaching as well as a valuable source of data.

I used a video camera during phase one of the project during an open day at a school to document the whole process. Because of a lack of experience in using this camera, the pictures came out well, but we could not capture the sound. Videoing the CSW School open day however proved to be a valuable source of data to provide the context and it also allowed for further observations.

I also used the video camera during the second phase workshop to document the CSW and Health Promoting Schools open day. In this day all schools participating in the project were sharing their experiences of what they learned in the project. Learning from the first failure to capture the sound during the videoing period, I practiced my video operating skills to ensure that the video was working properly and that it was also well programmed. The camera and video were used to provide evidence of learning and provided evidence of learners using learning support materials. However, in this study the video camera was under utilized. If it was used in classroom observations, it could have provided a lot more in-depth data that could have provided an opportunity for the research participants to analyse the use of learning support materials together.

3.4. Ethical issues in the research

McNiff *et al.* (1996) advise that when one is doing an action research project, one must have a good grasp of ethical issues. They note that it is important to consider the following ethical dimensions in an action research project: negotiating access; ensuring confidentiality of information; ensuring confidentiality of identity and data; respecting participants right to withdraw from the research; keeping others informed; maintaining intellectual property rights; and keeping good faith.

Drawing on these guidelines (*ibid*) as a way of addressing ethical issues in this study, I wrote a letter to all research participants asking for permission to use any data collected by either educators or the support team in relationship to the CSW project. The letter informed them of their right to withdraw their permission at any stage if they feel it necessary. In addition I informed the research participants personally that I would be using the data collected from this project for my research and for project evaluation purposes. As the research process unfolded I also regularly negotiated research project issues with all the participants.

Lotz (1996:108) citing Goodman (1992:121) notes that a view of the world as a complex interaction of reflexive subjects needs to be placed at the centre of our efforts to conduct research in schools and with educators. She (*ibid*, 107) further argues that group life must not only be understood by focusing only on the awareness of the actors, but must be understood in terms of its embeddedness within social, political and historical context.

Doing this research in a context of South Africa, in a society and school system that was affected by the injustices of apartheid and related forms of domination and power that were (and still are) present in our society, created additional ethical issues to consider. Our position (mine and the support team representing the university) required that we consider our position and roles critically. I became conscious of the fact that universities are believed to have a particular power and as a result tend to dominate and monopolise knowledge. As the support team and I worked with educators we had to be conscious of exposing and responding to issues associated with potentially unequal power relations in the research context. The support team and I tried to be transparent by keeping educators informed of everything that was happening in the project and by inviting them to participate and contribute at every given opportunity. We also encouraged reflexivity in the research (see Chapter 5). Goodman (1992:124 cited in Lotz, 1996: 107) argues, in support, that research should be conducted through a reflexive process which "… erodes the authority of academic discourse in order to challenge the concepts of power, legitimacy, and domination". Lotz (ibid, 107) argues for reciprocity in praxis-oriented research, which implies a mutual give-and-take, a mutual negotiation of meaning and power. Relationships of trust and mutual understanding built on the principles of respect for persons, honesty and justice, need to be nurtured and sustained if the research is to be meaningful and socially transformative (Lotz, 1996). An important ethical dimension of this research was therefore a reflexive perspective on power relations and the nature of social interactions taking place (see Chapter 5 and 6).

3.5. Research participants

DePoy and Hartman (1999) arguing from a socially critical perspective, note that the selection of the research team can be done in many ways. They suggest that it is possible to seek nominations or volunteers or recruit those who are already committed to the social problem being studied. Using this advice, we invited all the stakeholders who were willing to participate in the CSW project to participate in the research process.

Research participants included school educators who were involved in the CSW project, the support team that consisted of RUEEU staff and three community members. The RUEEU staff included Shady who was the RUEEU Manager and myself. And the three community members were Sogi, Glady and Lory. Sogi and Glady were both unemployed Grahamstown residents and Lory was a consultant working on a voluntary bases (see section 1.3).

We selected the educator participants through an open invitation to all those educators interested in the project to participate in the evaluation process. All the support team members agreed to participate in the research and research process.

We invited other institutions that were partners in the project to participate through an open invitation to contribute to the research process. While educators and the support team actively contributed to the evaluative dimension of project, other participants became critical friends.

3.6. Roles and relationship in the research process

In participatory action research, the relationship between the researcher and the team ought to be one of trust. Inevitably, as in my case, there is often a 'lead researcher'. To develop that trust, researchers must recognize the value of members' knowledge of themselves and each other, and become familiar with the group's purpose and process. I worked (as 'lead researcher') with different research participants with whom I interacted with at different levels. In my interaction with the other support team members, we did not experience trust problems. The support team members were work colleagues with whom I interact everyday. All were familiar with the culture of teamwork, which is a feature of the working culture in the RUEEU.

The support team and I, however, had to work at developing trust with the other research participants, especially the educators. To develop trust we tried to develop a relationship with educators based on mutual understanding and common concern for improving the quality of teaching and learning. We engaged them in all the processes of planning and in executing the activities of the project, and we tried to be as transparent as possible in whatever we were doing for the project, and always invited them to make an input.

One of the important dimensions of participatory action research is that group members should ideally be involved in all aspects of the process, from planning, acting and reflecting to the dissemination of results. By focusing on the participatory ethos of the participatory action research process we were all able to play multiple roles in the project activities (see Chapter 4).

The support team members played multiple roles, and contributed to the processes as materials developers, facilitators, workshop facilitators, workshop organizers, newsletter articles writers, researchers, report writers and project managers (e.g. Shady and myself).

In the research process, all contributed to the planning of activities, and all worked with educators to support the use of LSM in schools. All contributed to the reflection processes. Educators contributed by keeping learners' portfolios, and completing questionnaires, by helping to develop LSM and in reflective sessions.

3.7. Data management and analysis

Data was sorted according to the different stages of an action research cycle that occur over time, and took into consideration different project sites and activities. McNiff, Lomax, and Whitehead (1996:80) note that "…data emerges as a result of monitoring the action research cycle and this data emerges as records of plans, actions, and the steps taken to reflect upon and evaluate how these were created". They caution that managing these records is part of the requirement to be systematic in your research. Stenhouse (1978:36 cited in McNiff, Lomax & Whitehead, 1996: 81) indicates that sorting data should provide an archive of case records that can be used as a primary source of data. Stenhouse (1978:25 cited in Lotz, 1996:103) refers to levels of data organization, and describes the case data as all the materials assembled by the fieldworkers during the study.

Data analysis was negotiated with the research participants and in particular, with members of the support team. Schensul and Schensul (1991:191 cited in Lotz, 1996: 99) note that participation in the analysis of data, even if it is on an initially superficial level, can "… contribute immeasurably to its interpretation because of familiarity with the context of the project".

There were three layers of data analysis. In the first instance, I clustered the data from the pilot phase according to emerging themes, guided by the observation schedule. I documented this in an evaluation report. I circulated copies to the members of the support team for comments and validation. I also called a reflection and planning meeting to discuss the emerging findings of the report. I

then took this analysis further by creating six categories that are consistent with the research aims as well as the emerging issues/themes in the data. Pope and Ziebland (2000) point out that qualitative research uses analytical categories to describe and explain social phenomena.

The five analytical categories used in the second layer of data analysis includes:

- Perspectives on the use of LSM;
- Perspectives on why the LSM are not used;
- Perspectives on the effective use of LSM;
- Perspectives on the support processes associated with the use of LSM; and
- Contextual issues associated with the use of LSM.

I found these five analytical categories useful in analysing data in all three of the action research cycles (see Chapter 4). Further categories and sub categories were derived in a third layer of analysis (see Chapter 5) providing more in-depth insights into the research question. These are discussed in Chapter 5.

3.8. Validity and rigour in participatory action research

Winter (1989) argues that action research has a different conception of 'rigour' than that which characterizes positivist research. The coherence of the justifications of proposed actions and the coherence of the interpretations of the consequences and circumstances of the actions are what constitute rigour in action research (Carr & Kemmis, 1986). To ensure rigour in this research account I:

- gave a reasoned justification of my educational intentions (see Chapter 2);
- where possible, I made use of internal dialogue and critical friends through the participatory action research process;
- ensured a systematic and self conscious research design, data collection, interpretation and communication (Mays & Pope, 1995: 311);
- created an account of methods (ibid, 311); and

- wrote the text in a way that reflects the symbolic description as being true to the situation (with sincerity, honesty and self awareness) (Lotz, 1996).

Mays and Pope (1995: 311) indicate that quantitative and qualitative approaches are fundamentally different in their effort to ensure the validity and reliability of their findings. This argument is extended by Smith (1984 cited in Johnson undated: 282) who comments that some qualitative researchers have suggested that traditional quantitative criteria for reliability and validity are not relevant to qualitative research. Kincheloe (1991:3) also echoes this when s/he argues that "… validity is probably an inappropriate word in the non-positivist context" (see also Mays & Pope, 2000:50). Smith (*ibid*) contends that the basic epistemological and ontological assumptions of quantitative and qualitative research are incompatible, and therefore the concept of reliability and validity should be abandoned.

Kincheloe (1991:3) asserts that "… trustworthiness is a more appropriate word to use in a critical constructivist research lexicon", and s/he further notes that the word is helpful because it signifies a different set of assumptions about research purposes than does the term 'validity'. Kincheloe (*ibid*, 138) further argues, "… as critical educator researchers we constantly confront the issue of the trustworthiness of our action research". Johnson (undated: 282) notes that when qualitative researchers speak of research validity, they usually refer to qualitative research that is plausible, credible, trustworthy, and therefore defensible. Lather (1986: 66) notes that "…going beyond predisposition in our empirical efforts requires techniques that will give confidence in the trustworthiness of data". Kincheloe (1991) outlines criteria for assessing research trustworthiness of critical constructivist research. I have found his point on credibility of portrayals of constructed realities[3] useful in this study.

[3] Credibility is awarded only when constructions are plausible who constructed them. It however acknowledges that they might still be disagreements among those who constructed them.

Different qualitative researchers note that to ensure validity or trustworthiness (Koch, 1998: 885; Kincheloe, 1991; Lather, 1986: 66) in qualitative research, one needs to take into consideration triangulations (Mays & Pope, 1995; Lather, 1986; Johnson, undated), respondent validation (Koch, 1998: 885), clear exposition of methods of data collection and analysis (Koch, 1998: 885), reflexivity (Koch, 1998: 885; Johnson, undated: 284; Lather, 1986: 66), attention to negative cases (Koch, 1998: 885, Johnson, undated: 283), member checks (Guba, 1981 cited in Lather, 1986), fair dealing (Koch, 1998: 885) and relevance (Koch, 1998: 885) in the research process.

Drawing from the above literature, to ensure 'validity' or trustworthiness in this research I had to:

- take into consideration the triangulations by using different sources of data;
- ensure respondent validation by asking educators and support team members to check and confirm the evaluation report and other data;
- ensure reflexivity; and
- ensure member checks by encouraging comments on the findings and asking participants in the research process to make their inputs.

As explained above, this research tried to ensure validity and rigour through a consideration of trustworthiness criteria in qualitative research. A key dimension of this was ensuring that I provide a clear exposition of the methods of data collection and analysis in this chapter.

3.9. Conclusion

As described above, this chapter focused on the broader trends and emergent reasons for making decisions that shaped the final design of this research. In framing the research methodology, I have considered the following features of a research process in the CSW project, namely a research process that contributes

to professional development of all research participants and allows space for educators and the support team to improve their practice.

This study employed participatory action research informed by critical theory. Drawing from the work of Lotz (1996) and Fien (1993), I believed that this study should be responsive to curriculum issues and problems within their own contexts. I believed that it could develop a sense of ownership and responsibility amongst the research participants. This research aimed at supporting a socially critical orientation to curriculum development. Drawing from the work of Connole (1993), and Prasad and Caproni (1997), I have used the assumptions and perspectives of critical theory as orienting framework for this study. I have also noted that the use of LSM cannot be understood without an understanding of the historical context of schools, teaching and learning.

To create spaces for educator reflections, and the processes required to monitor the ongoing cycles of planning, acting and reflection in the CSW project, I used diverse research techniques. These techniques included participant observations, informal discussions, focus group interviews, field notes, reflective journals, educator reflective schedules, evaluation reports, questionnaires, workshops, videotapes and photographs. Drawing from the work of McNiff, Lomax and Whitehead (1996), and Goodman (cited in Lotz, 1996), I have noted that it is important to consider ethical dimensions in participatory action research projects. Participants were invited to participate in the research processes of the CSW project. In the research process, all research participants contributed to the planning of activities, and all worked with the educators to support the use of LSM. All research participants contributed to the reflection processes.

To ensure rigour in this research account I gave a reasoned justification of my educational intentions (see Chapter 2 and this chapter), and where possible, I made use of internal dialogue and critical friends in the participatory action research process. I also endeavoured to ensure a systematic and self-conscious

research design, data collection, interpretation and communication (Mays & Pope, 1995: 311) and created an account of methods (*ibid*, 311). I ensured that trustworthiness or “validity’ is taken into consideration as explained above.

In the next chapter, I will focus on the different cycles of inquiry in the participatory action research process in the CSW project as outlined in Table 3.1 and different findings of the research, as these emerged in the three cycles of inquiry.

CHAPTER 4

CYCLES OF INQUIRY IN THE CSW PROJECT

4.1. Introduction

This chapter reports on three cycles of the action research process. It focuses on the use of LSM in the CSW project. The first cycle of inquiry is centred on the collation, and use of the CSW pilot project learning support materials, and includes a planning, action and a reflection phase. The second cycle is grounded in the reflection phase of cycle one, and planning for this phase was based on the analysis of data, reflections and emerging issues from phase one. As Cohen, Manion and Morrison (2000: 228) suggest, action research uses feedback from the data in an ongoing cyclical process (see section 3.2.3.2). The second cycle of inquiry considers use of the CSW learning support materials in order to inform further development of LSM. It also considered the support educators need to effectively use learning support materials. The third cycle of inquiry considers the use of 'Health and Water' learning support materials and builds on the findings from cycle one and cycle two (see Table 3.1).

As noted in Chapter 3, this research followed a broad framework of cyclical processes (Masters, 1995) of planning, action and reflecting in the CSW project. The first cycle of the research process represents a description of the pilot phase of the CSW project, undertaken in 2000. Its aim was to inform further phases of the CSW project implementation and materials development in the year 2001. The outcomes of the research process were used to understand the processes, methods, and the strengths and weakness of the pilot phase. Joint plans for developing new learning support materials and plans for new actions in 2001 were formulated together with the support team and participating educators.

4.2. Cycle one: Trialling the CSW pilot materials

4.2.1. The planning phase

The CSW project was designed to help respond to waste management issues in Grahamstown. The two community members, Glady and Sogi, who participated in the RU/Gold Fields course[4], developed the concept. In their assignment they proposed ways of addressing waste management issues in Grahamstown through environmental education processes. Influenced by the fact that Lory and Sogi had previously attended a municipal meeting on the integrated development plan (IDP), where environmental management issues were discussed, the Rhodes University Environmental Education Unit (RUEEU) offered to provide support to the project. Shady, Sogi and Glady wrote letters to the schools, government officials, local NGOs and other training institutions that had an interest in waste management issues, inviting them to a workshop, held at the Grahamstown City Hall on 28 August 2000. The aim was to consult with stakeholders and draw up a programme of action. The CSW pilot project was formed. Another meeting date was set for 30 August 2000 to develop environmental educational activities based on a plan of action drawn up at the previous meeting. Educators, NGOs, municipal officials, DoE officials and fieldworkers attended this workshop to develop waste management educational activities at the RUEEU. The workshop was facilitated by Lory and Shady with the support of Sogi and Glady. Following the workshop, the support team members developed the LSM and learning programmes further. Many schools chose to participate in the project, but only six managed to start the project of which only four were supported by the support team. The LSM were then

[4] The RU/Gold Fields course is a semi-distance course offered the Rhodes University Environmental Education Unit. The course requires praxis based assignments and Sogi and Glady's assignments focused on waste issues in Grahamstown.

introduced to schools. The support team developed plans to support educators in implementing these educational activities.

As an employee in the RUEEU I was asked to be part of the CSW support team. I was given two main tasks, to support Sogi and Glady and the educators. Through negotiation and discussion it appeared that we needed to evaluate the project. It was recommended that I co-ordinate the evaluation process of the project. I invited the support team to plan the evaluation process, thus signalling the start of the participatory research process.

I, together with the support team, decided to draw up an observation schedule as a way of gathering data. I designed an observation and evaluation schedule, and then gave draft copies to all members of the support team for comments and input. This was subsequently discussed, refined and finalised (see Appendix A1), and then used by the CSW support team members in the field as described in section 3.3.

The observation and evaluation schedule was used by support team members, as a way of documenting observations during and after each activity s/he had been part of. We agreed that each member of the support team would keep a reflective journal[5] (see section 3.3.4.), and complete an observation schedule. As part of their responsibilities, the fieldworkers were asked to write formative reports on the project at the end of each phase, which served as another source of data (see section 3.3.5).

In addition, the first sets of LSM were developed in the planning phase. Different types of environmental education LSM were selected and collated (by educators, NGOs, municipal partners and DoE officials at the workshop) and compiled for the pilot project (by the support team after the workshop). They were designed to

[5] As indicated in section 3.3 the support team members were unable to compile reflective journals, and therefore only completed the observation schedules, and wrote their reports.

support educator professional development at schools and the implementation of the activities in school. The first set of LSM were comprised of:

- Learning Programme Units for the Foundation Phase, Intermediate Phase and Senior Phase. The Learning Programme Units contain activities and ideas for classroom/school-based implementation (see Table 4.1).
- A series of LSM around the theme of "Waste". These include materials that provide information to educators like fact sheets or information sheets and activities to support investigations e.g. audit sheets for use in excursions, and ideas for taking action (see Table 4.1 below for a detailed list of all the LSM contained in the packs provided to educators after the materials development workshop).

Table 4.1: Different kinds of LSM provided to educators in each phase

Phases	**Learning Support Materials**
Foundation Phase	• Learning programme • Blank learning programme template • Durban Solid Waste (DSW) fact sheets (paper recycling, can recycling, plastic recycling and glass recycling) • Waste activity sheet (glass, metal and paper) • 'Wise Up on Waste' information sheet and glossary of waste words
Intermediate Phase	• Learning programme • Blank learning programme template • Waste photographs (local Grahamstown pictures and others) and photo support sheet • Fact sheets (paper recycling, can recycling, glass recycling) • Information sheets (glossary of waste words, background information for mind map, life story background sheet) • Waste activity sheets (glass, metal, paper, waste auditing questionnaire, waste site questionnaire, life story worksheet)
Senior Phase	• Learning programme • Blank learning programme template • Information sheets ('the impact of waste on health and environment', 'Hazardous waste', 'Types of pollution', 'Wise up on Waste' information on Landfill Sites', and Chapter 2 of the White Paper on Integrated Pollution and Waste Management for South Africa, 2000) • Waste activity sheets (Trashy table, Landfill site worksheet, Fairest Cape Association flysheet-Waste Workshop). Article from Earth Year 'What is household waste?' Example of a mind map, Article on 'Learning about landfill sites'

As mentioned earlier, the development and selection of these LSM was a collaborative undertaking between the RUEEU, fieldworkers, educators, Department of Education and Local Municipality Officers. The LSM were developed using the emerging framework developed for the National Environmental Education Programme (NEEP-GET) (see section 2.6.2.), and drew on some of the LSM provided to educators in the NEEP-GET pilot project.

Figure 4.1: Teachers and other stakeholders selecting the LSM during the LSM development workshop (pilot phase)

Figure 4.2: Teachers and other stakeholders selecting the LSM during the LSM development workshop (phase 2)

4.2.2. Project action and data collection phase

During the first materials development workshop educators selected and collated different LSM and developed learning programme activities with the main focus on waste issues. The support staff of the project completed that work. In this way, educators participated in the curriculum development and in the selection of different LSM to support the curriculum process.

The support team introduced the activities to the educators that were interested in implementing the activities at school. They also supported educators to use the LSM, offering different kinds of support, as they saw fit. This included orienting educators to the LSM, and observing and supporting educators to implement the project activities. I also provided professional development support to educators through workshops and classroom visits and advice. The support team members were invited to classroom sessions to provide support, and often played multiple roles in this project as outlined in section 3.6. For example, Sogi and Glady contributed to the selection of LSM and materials development, and provided advisory support to educators, conducted research and wrote monthly progress reports. Lory provided support to educators and to Glady and Sogi. Shady managed the project, fundraised, facilitated project meetings and workshops and also provided support to educators and research support. I drew up the observation schedule, facilitated evaluation meetings, and provided support to educators and to Glady and Sogi, and co-ordinated the action research process. In this phase, other stakeholders participated in drawing up the plan of action and in the selection of environmental education LSM. They contributed ideas for learning programme development, helped with learning support materials development and commented on the draft evaluation reports.

Figure 4.3: Some of the support team members preparing for the workshop

During this phase, the support team contributed to the research by completing observation schedules and by writing field notes as a way of data collection. I provided support to the fieldworkers on how to complete the observation schedule and reflective journals, but we found the reflective journals too difficult (see section 3.3.6). Each educator completed five activities. In each activity two members of the support team were invited to support the educators and also do observations. Each of the fieldworkers visited the schools with one member of the RUEEU who had experience in providing support to educators and in conducting research.

DePoy and Hartmann (1999) note that research projects often involve both professional researchers and lay researchers (lay researchers refer to those people who have no professional training in research). The aim was to collect data and also empower the fieldworkers as researchers and environmental educators. The experienced researcher mainly visited schools to support educators and also to provide support to the fieldworkers on how to complete the questionnaire. Thus the action phase included the provision of research support to others involved in the participatory action research process.

4.2.3. Findings of the first cycle of the research

As noted in section 3.6., data analysis was negotiated with the research participants and in particular with members of the support team. Following the

first evaluation report and after the first round of data analysis, data analysis categories were created (see section 3.7). Data from the pilot phase was analysed using these categories, providing us with different perspectives on the use of LSM in this phase. I now discuss the findings within the framework of these data analysis categories.

4.2.3.1. Perspectives on the use of LSM

It appears that educators used the resources differently and for different purposes. This includes:

- two educators used the LSM to find answers to questions;
- one educator used the LSM to facilitate discussions;
- two educators used the LSM as a teaching guide and to get information; as reference for learners; and to ask questions from learners;
- one educator used the LSM as a research tool; and
- one educator used the LSM to explain concepts to the learners.

From the above it appears that the educators used the LSM mostly to access information for teaching, to answer questions and to ask questions. While we were able to establish this, the research process did not provide insights into which LSM were useful and why and which were not and why. This indicated that we needed to review the evaluation methods and explore different strategies to address these questions.

4.2.3.2. Perspectives on why the LSM were not used

In two visits to one school, the support team members noted that educators were not able to use the LSM. In one case the support team had to intervene and lead the activity. It was not clear as to why educators were not able to use the LSM. The support team helped educators by giving the LSM to the learners and encouraged learners to use them to get information. In this case the support

team member, in his effort to help the situation, ended up being the facilitator of the lesson, and in so doing, neglected to probe why the LSM were not being used. In another instance it appeared that the educator did not use the LSM because the school had no photocopying machine to photocopy the LSM.

4.2.3.3. Perspectives on the effective use of LSM

In most observations where the LSM were used, the support team felt that the LSM were appropriate. The support team felt that generally where the LSM were used, they were appropriately used. The following indicators of effective use of LSM emerged from our reflections in this phase:

- the support team member noted that all necessary materials were used in that particular lesson;
- learners managed to answer questions;
- materials were understood and explained well; and
- learners used them without asking questions and learners responded very well to them.

This indicates some of the factors that determined the effectiveness of the LSM and their use. It also indicates the importance of educators and learners engagement with LSM, if the expected learning outcomes are to be achieved. We did not however, probe these indicators in any depth (for example, did the fact that learners did not ask questions signify meaningful learning?).

4.2.3.4. Perspectives on the support processes associated with the use of LSM

It appears that educators generally needed support in a few areas. In three cases, two in one school and one in another, educators needed support in monitoring and controlling group work. One support team member felt that as

educators become familiar with the materials, they would need less support. An educator from one school needed support in planning and facilitating the activities. One educator needed support in maintaining class discipline. One educator needed support to facilitate the lesson since the educator was involved in school examinations at the time. One educator did not need help at all. The support team felt that the educator was doing very well.

The support team found that educators had different expectations of the role of the support team, including: to be observers; to discuss the activity of the day with them; to provide additional classroom management support; to help with group work and to look after learners; in some cases to facilitate the classroom activities where the support team was to run the activities while the educator was occupied with examinations; and to plan and teach together with educators.

Reflections from the support team indicate that it appears that in some cases the support team members found themselves facilitating the whole session. That implies that the support team was playing the role of an educator but not supporting the educator. Considering that one of the primary objectives of this project was to enable educators' professional development, and the support team role was to support educators, we therefore had to reflect on ways of improving this role so that we did not take over the educators' responsibility to facilitate classroom teaching. We noted that support team members playing the role of the educator would not empower us professionally in our support role, nor would it enable the educator to improve their teaching role, and the use of LSM. This raised an important question as to whether the support team members were there to support educators, to teach for educators or replace educators.

4.2.3.5. Contextual issues associated with the use of LSM

There were number of contextual issues that were associated with the use of environmental education LSM in the classroom. These included the timeframe for

activities, educator-learner relationships, appropriateness of LSM, and language used in the classroom.

In most cases, educators were using English as the medium of instruction. The support team felt that the language used was appropriate. But in some cases they felt that learners were having a problem communicating in English, and since learners in most classes were predominantly isiXhosa speakers the educators had to translate for the learners to understand.

The support team identified the need to focus on educator learner relationships as one of the contextual issues associated with the use of learning support materials. The support team felt that the educator learner relationship was generally good and encouraged a positive learning environment. This appears in various fieldworkers' reports.

4.2.4. Reflections on the research findings and process

From the project piloting (cycle one of the inquiry) we were therefore able to identify the following areas for ongoing research:

- We needed to reflexively review the role of the support team members in schools. We suggested that in the next cycle of the project the support staff needed to ensure that they did not replace educators, and its support should be done in a manner that would ensure that the educator was the mediator of learning in the classroom.

- Reflecting on why educators were not using the LSM, Shady, through her interaction with the learners and reflecting on the help she provided during group work and other activities, felt that if educators were more familiar with the materials, they would need less help of this kind. We therefore needed to

do further research as to why educators were not using the LSM and whether greater familiarity would enable them to use the LSM better.

- As we reflected on the findings it appeared that our research failed to provide us with insights into the specific LSM that were used or not used. We felt that we needed to answer this question to inform the next phase of materials development, which would involve a review of the waste management education LSM. We needed to know which LSM needed to be changed and why.

- In cases where the educators did not use the LSM because of lack photocopying facilities the support team felt that the RUEEU would need to provide some photocopying support to those schools. Investigating this problem further, we noted that they could not use the LSM because they had no photocopying paper. In response, the RUEEU offered to donate re-cycled paper to help that school. We also offered to encourage the school to keep one-sided printed papers (collected at RUEEU) for re-use. We had to do further research to see if this would help the educator use the LSM.

We were also able to identify the following areas for improvement in the research methods used in cycle one of the research process:

- It appeared from the data that the questions we asked were inadequate to give the answers we needed, we therefore needed to review the questions that we used in the observation schedule.

- It also appeared that some of the questions we were trying to answer through observations could have been answered better if they included educators' perspectives as they were the ones who were implementing the activities directly. We therefore needed to review our research techniques, and the role of educators in the participatory research process.

- We also realized that in the findings we had, educator perspectives were lacking. We suggested that educators' perspectives needed to be incorporated into the evaluation report. As a means of including educators' perspectives on these findings we agreed that I would conduct focus group interviews with educators before the next materials development workshop we were planning (see section 3.3.3).

- We also realised that the fieldworkers (Sogi and Glady) had problems in completing the observation schedule, and we decided that in the next cycle of inquiry we would conduct a fieldworkers' workshop to improve completion of the questionnaires or reflective schedules. We then suggested that I would take responsibility to provide support to the fieldworkers.

The problems faced by the fieldworkers were attributed to the fact they were participating in the research for the first time, so the RUEEU needed to support them. Training of fieldworkers is also recommended by DePoy and Hartman (1999:1) (see section 4.3.3.1). They recommended that before the project is designed and conducted, the lay researchers must have the language and skills to be full participants in the inquiry. We realised that training in the relevant research thinking and observation skills should be done in manner that is meaningful to all participants in the research team, so that all understand and are capable of upholding the rigor of the inquiry.

4.2.5. Summary of cycle one of inquiry

As noted in section 1.2, the goals of this research were to explore the use of LSM, establish which LSM are used or not used by educators and the reasons why, and to explore ways in which educators can be supported to implement environmental education processes in C2005 in the context of the CSW project. The aims were to improve the LSM used by educators, make recommendations

on the kinds of support educators need to be able to use LSM in the context of C2005. In this pilot phase of the project (cycle one of the participatory action research process), participant observations, field notes, reflective journals and progress reports were used as the main data sources.

From the data it appears that educators used LSM differently and for different purposes. Purposes identified included to access information, as reference and to ask and answer questions. We identified that educators needed different kinds of support including planning; support for group work methods; classroom facilitation; and maintaining discipline. Ranges of contextual issues associated with the use of LSM were identified including: language, educator learner relationships and appropriateness of LSM. We also developed some indicators to identify what constitutes the effective use of LSM (see section 4.3.4.3) and we identified some of the logistical factors that can impede the use of LSM (e.g. photocopying).

During the pilot phase this research failed to provide answers to some issues we wanted to address. From the pilot project reflections, we were therefore able to identify the following areas for further research:

- to reflexively review the role of the support team;
- to further explore why educators are not using LSM;
- to explore which LSM are used and which LSM are not used; and
- to establish whether educators find LSM useful to learn more about the subject.

We were also able to identify the following areas for further improvement in the research methods used in the research process including:

- reviewing the questions used in the observation schedule and refining them;

- planning a research method that will incorporate educators' perspectives in the research; and
- planning workshops for fieldworkers to enable them to complete the observation schedule effectively.

Having discussed the above findings in the cycle one of the inquiry, I will now turn to a description of the research process and the findings of cycle two of the inquiry.

4.3. Cycle two of the inquiry: The use of LSM in phase one of the CSW Project

4.3.1. Reflection and planning

Drawing on the emerging findings from the CSW pilot phase in cycle one (reported above), we felt that we did not have enough information to enable us to improve the LSM for phase one of the project, so we needed to plan further data collection sessions to capture educators' perspectives and to provide some answers which we thought would also be useful when we planned and implemented phase one of the project. We also needed to start planning for phase one implementation. In January 2001 we had a meeting with educators and all other stakeholders involved in the CSW project. The aim of that meeting was to provide an opportunity for educators to reflect on the evaluation report produced from the pilot phase; to comment and reflect on the pilot phase activities; and also to start planning for the implementation phase of the project (phase one).

The meeting was attended by educators from all schools involved in the project, as well as those who were interested in joining the project, NGOs, DoE officials and Grahamstown Municipal officials (similar to the first workshop held to develop the original pilot materials). Shady updated all participants on the status

of the project regarding funding[6]. The reason I highlight the funding issue in this context is because it had some implications that could affect the research and school activities (e.g. we provided schools with some funding to take learners on one excursion, as part of the learning programme).

Drawing on the emerging findings of the first cycle of inquiry, I was able to clarify the roles of the support team and the roles of educators in the classroom at this workshop. As noted above, the findings of the first cycle indicated that educators' perspectives were missing from the evaluation report. As a way of sharing the research findings, I presented the evaluation report to the participants. Copies of the evaluation report were given to all research participants prior to the meeting. This was a way of validating data and also improving the project. I asked the participants to comment on the evaluation report and to suggest changes and areas of improvement. It appears that the evaluation report was well received by educators and other participants.

Following comments on the evaluation report, we then started to plan for the implementation phase of the project. The participants were asked to suggest activities for the implementation phase. The following were suggested:

- To start the project implementation early in the year;
- All research participants to commit themselves to the project;
- Enough LSM should be provided to schools;
- We should give feedback to educators' immediately after the classroom observations;
- Organisations providing support to educators should share projects and avoid overlaps of project and duplication;

[6] Following the pilot phase, we applied to WWF for a small grant to fund the school-based activities. This grant was not approved in 2001, and the project was run on a small amount of funding provided by the RUEEU. This covered excursion costs for each school; production of the materials; and field worker fees, to undertake the support in schools.

- Project meetings should be organised in the morning and not in the afternoons;
- Educators should be provided enough time to familiarise themselves with the LSM; and
- The project activities should be designed to fit the requirements of the formal curriculum.

Following this, in early February 2001 we arranged a meeting with educators and other project stakeholders. The reason for the meeting was to plan for data collection sessions to gather more data to inform the next phase of the LSM development. We agreed that the focus groups interviews would be held on the 15th February, followed by a meeting to review the waste LSM produced in the pilot phase, and then to re-develop them if necessary on the 21st February 2001.

4.3.2. Action phase

To fill the gaps that were not covered in the first cycle of data collection I, together with the support team (after we had discussed it with the educators) designed a focus group interview schedule (see Appendix A3) that I would use to probe further issues that were not covered in the draft evaluation report. On the 15th February 2001, the support team and I went to a school to have a focus group interview meeting with educators. Regrettably, only one educator turned up for that meeting. The rest of the educators did not come. At the time we did not know why. We later learnt that educators were on strike, and as a result they could not attend. We had to immediately re-plan so that we would be able to get the necessary insights before the date of the review of the LSM. Considering that we did not have enough time to get the insights we needed, I discussed the issue with the support team and the educator who was there. We agreed that I should design a short questionnaire that educators would fill in. I designed that questionnaire with five questions (see Appendix A4). I delivered it to the five educators who were participating on the project and four managed to complete it

and one educator did not. That questionnaire provided some useful insights to complement the draft evaluation report and also provided further insights on the use of LSM.

Later in February, the support team and I conducted a workshop to review and improve the waste education learning support materials. Lory and I facilitated the workshop with the assistance of Sogi and Glady. As a result of that workshop all educators seemed to be satisfied with the LSM and they suggested that the LSM should not be changed and should continue to be used as it is. After that the support team members made copies of all the LSM and distributed them to all the schools involved to start implementing the project activities at schools (see Appendix B for a full set of the Waste materials that were distributed to the schools).

Having learnt from the first cycle of inquiry that educators' perspectives were lacking in the evaluation report, we decided to put a teacher reflection schedule into the activities pack (see Appendix A9). The support team members were also given fieldworker reflection schedules with the same questions as those contained in the educator reflective schedule to be completed after each activity. The educator reflective schedule and fieldworker reflective schedule were designed in consultation with the educators and other support team members involved in the project. Drawing on my experience of working with the NEEP-GET pilot research data, I decided to include a school and teacher profile as part of the LSM (see Appendix A7). This proved to be useful in providing insights into the contextual issues.

The resource pack consisted of the same LSM as the LSM used during the pilot phase (see Appendix B). The only addition to it was the educators' reflective schedule and the school profile questionnaire.

Two schools and two educators withdrew from the project. In one case, the educator involved in the project was changing his job to a new school; no other educator was available to continue project activities at that school. In the other case, the educator could not cope with the project activities because she was too busy with other school commitments. Thus, from the schools that were involved in the pilot phase, we only remained with three schools. The three schools started implementing the schools activities. For the purpose of this research, I will refer to these schools as school 1, school 2 and school 3. In addition to all the schools that were involved, two other schools (school 4 and school 5) wanted to join the project, but had difficulty in implementing the activities. We decided to accommodate the new schools.

I visited the new schools to introduce educators to the LSM and the project. School 4 started to implement the project activities immediately after that, and school 5 struggled. Sogi visited school 4 three times, and in school 5, Sogi made more than ten visits try to arrange date for educators to start the project. Promises were always made but a number of things kept on disturbing the schools activities, for example the school was committed to many projects, and educators were not clear on how to use the LSM pack.

Sogi and Glady finished writing their term reports. They completed the fieldworker reflection schedules. School 1 completed all the teacher reflective schedules for the activities, school 2 finished all the reflective schedules and kept a portfolio, and school 3 could not finish the reflective schedule, but Glady managed to complete all the fieldworker reflective schedules for the school 3 activities. School 4 completed all the educator reflective schedules and a portfolio.

During this cycle, data was collected using the teacher reflective schedules, fieldworker reflective schedules, school profile and educator portfolio, and workshop data.

4.3.3. Findings from cycle two of the inquiry

In analysing data from phase one of the project (cycle two of the inquiry process), I applied the same analytical categories used to analyse the pilot phase data as a starting point (see section 4.6). During this phase two new analytical categories emerged. I decided to present the data as per school case so that it would enable us to understand the unique circumstances of each school, a process that would enable us to focus and respond to individual school needs. Reporting the data per school case also helped us to consider the finer details of each case. We found this level of detail important to assist us to answer the research question. The individual school cases are reported below.

4.3.3.1. The case of school 1

4.3.3.1.1. Contextual issues associated with the use of LSM

T5 is a Grade 1 educator at School 1. School 1 is a primary school located in Grahamstown. She is responsible for teaching all learning areas, and she has an average of 29 learners in her class. Most of her learners use isiXhosa as their home language, and much of her teaching is conducted in isiXhosa and in a few cases English second language. Most of her learners cannot read or write.

4.3.3.1.2. Perspectives on the use of LSM

T5 used all the LSM needed for each activity. These include learning programme unit (LPU) and other waste materials supplied for each activity (see Appendix B, and Table 4.1). T5 and Glady note that she used the LSM by asking learners questions, as they are phrased in the provided learning programmes, and she also used the learning programmes to read in preparation for the lesson. Glady notes that only the educator used the LSM and not the learners. T5 notes that she used the LSM to gain more insights into issues and to understand them

better. T5 and Glady note that the LSM were appropriate for T5 to prepare and plan her lessons.

4.3.3.1.3. Perspectives on why the LSM are not used

T5 notes that the problem with the LSM is that she could not encourage learners to use them because of their language and grade level.

4.3.3.1.4. Perspectives on the effective use of LSM

The evidence of learning outcomes seems to confirm the effective use of the LSM by T5. T5 mediated the LSM to make sure that the activities would work. T5 read the LSM to prepare and plan for the lesson. The LPU was well used in this case considering that the activities were carried out as suggested in the LSM. T5's mediation role involved explaining and interpreting the LSM for learners, and this seemed to have worked well. As a result the learners were able to achieve the expected outcomes. These include posters made of waste and labelled in isiXhosa, learners ability to classify waste into different types, collect waste, and do mathematical calculations, and lastly to use waste materials to create waste items (i.e. waste person, cars, house and invites for the open day).

4.3.3.1.5. Perspectives on the support processes associated with the use of LSM

Glady notes that the educator needed support in working with groups, and she further notes that she saw the need to help learners when doing their group work, to help with the sharing of equipment, and to help learners to paste and to help the educator to control group work. T5 also notes that the support team supported her by providing her with the LSM and through the provision of workshops. Sogi and Glady note that the workshop seemed very useful to enable educators to use the LSM and to understand environmental issues. In this case,

it seems that T5 required assistance with classroom management; and that both the workshops and the LSM appeared to be a significant support to T5.

4.3.3.2. The case of school 2

4.3.3.2.1. Contextual issues associated with the use of LSM

T2 is a Grade 1 educator at School 2. School 2 is a lower primary school located in Grahamstown. She has been teaching for 22 years, and has a Junior Primary Educators Diploma and a Further Diploma in Remedial Education. At the time of the research she was completing the final year of Bachelor of Arts Degree by distance learning. She is responsible for teaching all learning areas, and she has an average of 29 learners in her class. Most of her learners use isiXhosa as their home language, and much of her teaching is conducted in isiXhosa and in a few cases English second language. Most of her learners cannot read or write.

T2 sees the environment as the physical surroundings, the conditions and circumstances in which a person lives; and this includes animals, government, people, money, nature, air and water. T2 has never been involved in environmental education in-service training before. She sees littering, waste and health issues as the main environmental issues facing the school.

T2 does not know much about OBE, and she had not been trained. She sees OBE as a child centred, not educator centred curriculum. She uses question and answer methods, show and tell and group work as her main teaching methods.

T2 notes that her relationship with the learners is good, but is different in different situations. She probes answers from the learners, and provides guidance. She also facilitates group work and learner activities. She sometimes works with the

learners, for example, when they were creating a waste person and when they were creating songs. T2 notes that learners were involved in lessons by answering questions, doing their activities, for example, collecting and sorting different types of waste, counting waste, constructing the waste person, and making and reciting songs on waste.

4.3.3.2.2. Perspectives on the use of LSM

T2 used all the Waste Activity Sheets 1, 2 and 3, Wise Up on Waste Page 5, 20-22, and all the Waste Pack activity sheets (see Appendix B for a sample of the Foundation Phase waste materials). T2 and her learners also brought some extra materials suggested in the learning programme to use for some classroom activities. These include glue, string, paints, brushes, wool and papers. It appears that T2 used the LSM to get information she needed for the activities, and she found the information sheets very useful. T2 used the LSM in the class and not the learners. She encouraged learners to use the LSM by showing them what she had in the pack and by explaining what is written. T2 used the LSM to read about the activities, to facilitate discussion on environmental problems and as reference materials. She used the LSM to plan her activities. She used most of the LSM required for the different activities. T2 notes that some of the LSM were appropriate for the learners, and that there were some that were not appropriate.

4.3.3.2.3. Perspectives on why the LSM are not used

T2 notes that she could not use some of the LSM because they were not related to the activities and they were not relevant to the context in which her learners live. She also notes that learners could not use the LSM because they could not read. T2 could not use some of the LSM with the learners because of their age level and their inability to read. As way of overcoming that, T2 selected the LSM

that she thought were relevant and she used these for reference purposes and used that information to facilitate learning. She also explained the information to the learners. T2 notes further that although the learners had a problem in reading, they were able to interact with those LSM where they had to use pictures, and through her mediation.

4.3.3.2.4. Perspectives on the effective use of LSM

The evidence of learning outcomes (see Table 4.3) in this case seems to confirm that LSM were effectively used. In this case, T2's mediation role seems to have enabled the effective use of LSM. Considering that learners could not read (literacy), T2 seemed to have read the LSM and used the questions from the LSM to facilitate the lesson and explained the information that is in the LSM to learners. Where learners could not understand T2 explained to learners. Where learners seemed to have a problem of language or literacy level, she managed to select the relevant LSM and the ones that learners could use (the LSM with pictures). As a result of that learners seemed to have achieved the expected outcomes of each activity (see section 4.3.3).

4.3.3.2.5. Learners work as evidence of learning outcomes and the use of LSM

T2 notes that learners developed understanding and were able to answer questions posed by the educator and were able to do activities they were supposed to do in these activities. This emerged through the following work identified by T2, namely ability to answer questions, managing to sort our different kinds of waste, using waste to create objects, writing waste educational songs and performing them and sharing their findings with other schools and other educators (see examples of learners work below in Figure 4.1).

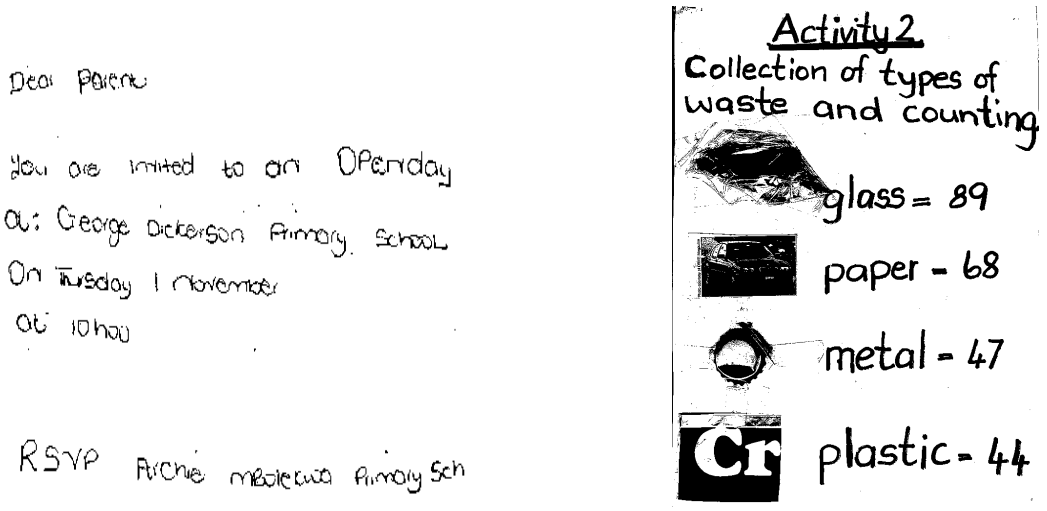


Figure 4.4: Examples of learners work

4.3.3.2.6. Perspectives on the support processes associated with the use of LSM

Glady notes that T2 did not need any support from the support team, but Sogi provided support to T2. Sogi observed the groups, and helped them to sort waste. He was observing and giving guidance where he felt there was a need. In this case, the LSM seemed to provide the teacher with the necessary support for conducting the series of lessons suggested in the LPU.

4.3.3.3. The case of school 3

4.3.3.3.1. Contextual issues associated with the use of LSM

T3 is an educator at school 3. School 3 is a senior primary school located in Grahamstown. It is a historically coloured school. T3 teaches Grade 5, 6 and 7. Her Grade 6 class participated in the project. T3 has been teaching for 30 years, and has a lower primary educators certificate (LPTC). During this study, she has been completing a Diploma in Education. She is responsible for teaching LLC (Afrikaans) and Natural Science, and she has an average number of 45 learners

in her class. Most of her learners speak Afrikaans as their home language, and much of her teaching is conducted in Afrikaans.

T3 sees environment as the world around you, your home, community, school and nature, and she has been involved in environmental education before. T3 describes littering and poor sanitation facilities as the environmental issues faced by her school.

T3 sees OBE as a new teaching approach which is learner centred, and she notes that in OBE learners are allowed to work on their own, at their own pace, discover things for themselves and their work is assessed continuously. T3 uses question and answer, group work, solitaire, critical thinking and project work as her main teaching methods.

Both T3 and Sogi note that the educator learner relationship was very good, and the learners enjoyed the lessons. Sogi notes that learners respected their educator and were able to answer questions. Learners were actively involved in making predictions, brainstorming and sorting waste products, answering questions and talking to each other during group discussions.

4.3.3.3.2. Perspectives on the use of LSM

T3 notes that she used all the LSM that were required for the activities. She used the questionnaire and waste material life story sheet in activity 1, local Grahamstown waste photographs in activity 2, and the landfill site questionnaire (see table 4.1 and appendix B for a sample of the waste materials provided for the Senior Phase). T3 did not only use the LSM provided by the support team, she also used the Science and Technology Grade 4 educators' manual. T3 notes that the black and white photographs were most useful to be used for group discussion and other group work.

T3 notes that she encouraged the use of the LSM by asking learners to study the photos in groups and identify diseases, environmental problems and suggest possible solutions. T3 also used the LSM to encourage group work, and also to encourage learners to do investigation. T3 notes that the LSM were used both by the educator and learners. T3 notes that all the LSM were useful and they made her work easier. T3 also notes that sometimes she was asking questions directly from the questionnaire.

4.3.3.3.3. Perspectives on why the LSM are not used

Sogi notes that all the LSM were used, but in some cases there were difficulties in using the LSM. Some questions were too difficult for the learners to understand, so the educator had to explain it to the learners for clarity. Where learners had to play a game using pictures in the manual, they had difficulty in identifying sources of pollution and making a list of them. T3 had to then guide them and explain the game to the learners. Sogi also notes that in his presence the educator appeared to have used the extra resources more often than the LSM we provided, and he further notes that the reason for that is because it was more comprehensive than the one we provided.

4.3.3.3.4. Perspectives on the effective use of LSM

The findings suggest that T3 successfully used the LSM. It appears that the educator's mediation role had an impact in enabling the effective use of the LSM. When learners struggled with the picture game activity, T3 explained the game instructions to learners in a simple way. When she discovered that there were more comprehensive LSM available than the ones provided in one of the activities, she chose to use it to make learning possible. When she noted that questions in the LSM were difficult for the learners she simplified it to the level of the learners. As a result of these interactions between the educator and learners in using the LSM, learners were able to achieve the expected learning outcomes.

These include correctly answering the audit questionnaires, identifying sources of water pollution and suggesting possible solutions, showing awareness of environmental issues and showing evidence of an ability to answer educator's questions and do the activities as expected. T3 notes that the LSM were appropriate to use in her grade because they were clear and large enough to study, and the information in the LSM was relevant to the educator and learners' experience. She notes that she effectively used the LSM.

4.3.3.3.5. Perspectives on the support processes associated with the use of LSM

T3 notes that the support team was very supportive of her work and did not criticize. The support team notes that in most cases there was no need to provide any support to T3 because she was doing very well. So Sogi mostly observed what was happening in the classroom. Both Sogi and T3 note that Sogi provided some support in the class by helping with group work, encouraging the educators to use group work and explain its importance. Sogi also helped learners to complete questionnaires. In this case, it seems that the LSM provided adequate support to the educator to plan for, and complete the LPU with learners; but that she required some support for managing group work.

4.3.3.4. The case of school 4

4.3.3.4.1. Contextual issues associated with the use of LSM

T4 is an educator at school 4. School 4 is a school in Grahamstown starting from Grade 1 to Grade 4. T4 has been teaching for 11 years, and has an M+3 diploma or educator's three-year diploma. T4 is teaching Language, Literacy and Communication (LLC) and Natural Sciences and has an average of 36 learners in her classes. Most of her learners speak isiXhosa as their home language,

much of her teaching is conducted in isiXhosa, and she uses English on rare occasions. Most of her learners cannot read and write English.

T4 sees the environment as the surrounding that one belongs to. She notes that she has never been involved in environmental education before.

T4 sees OBE as a new learning and teaching approach, involving child centred methods. T3 has been involved in in-service training, as a participant in the Imbewu project[7]. T4 uses the question and answer approach, show and tell and group work as her main teaching methods. She notes that she would not change her teaching methods because in her teaching she finds group discussions useful to provide an opportunity for the sharing of ideas.

T4 and Sogi note that there is a lot of cooperation between educators and learners. T4 notes that learners were involved in the lesson by answering the questions asked by the educator. T4 attributed that to the Grade level of learners. T4 notes that the LSM were appropriate for educator use.

4.3.3.4.2. Perspectives on the use of LSM

It appears that the LPU, pictures and questionnaires, waste information sheets, posters, and magazines were used in all the activities (see Table 4.1 and Appendix B for a sample of the Intermediate Phase waste materials). T4 and Sogi note that T4 used most of the required the LSM in all project activities. T4 notes that when she used the mind map with learners she referred to the LSM provided to get more information during the activity, and she also found the questionnaires very useful. T4 also notes that she encouraged learners to cut pictures from magazines to reflect on what they observed in the landfill site and

[7] This is a large-scale multi-million rand donor funded in service training programme currently running in the Eastern Cape Province Department of Education. The purpose of this programme is to improve the quality of teaching and learning.

to make posters. She also notes that the LSM helped to explain difficult concepts and she encouraged learners to use the LSM.

4.3.3.4.3. Perspectives on why the LSM are not used

T4 notes that she did experience some problems in the use of the LSM. She struggled to have enough copies for the learners, because she does not have a photocopying machine at school. T4 also notes that while most of the LSM were appropriate the black and white photographs were not appropriate because learners had difficulty in identifying what is happening in the picture and it was not clear. T4 and Sogi also note that language used in the LSM is a problem. When learners had to complete the questionnaire, they had difficulty because they could not understand the language. The educator encouraged learners to seek help from the older learners at home to understand the questionnaire.

4.3.3.4.4. Perspectives on the effective use of LSM

T4 seemed to have also effectively used the LSM. She managed to read the LSM, and plan and implement activities as expected. It appears that T4's mediation role made the effective use of LSM possible. For example, when learners had difficulty with pictures because they were unclear, T4 explained and interpreted the picture to the learners. Where learners had language problems, T4 helped to explain what is on the LSM in isiXhosa (the learners' language) and also encouraged them to seek help from others. The effective use of the LSM was confirmed by the ability of learners to achieve the expected learning outcomes. These include completing the landfill site questionnaire, making posters, completing the mind map of the waste 'life story' and showing an evidence of ability to answer the educators' questions correctly.

4.4.3.4.5. Perspectives on the support processes associated with the use of LSM

T4 notes that she needed the support team's support to supply the LSM needed at school, and also expected the support team to explain more about the activities and continue to provide workshops for educators. Sogy notes that he could only do observation in T4's class because he felt that T4 had no difficulties in using the LSM. In this case, the LSM appeared to provide the support required for completion of the LPU.

For the purposes of clarity, I have summarised the findings of cycle two of the inquiry in the form of a table (see Table 4.2 below).

Table 4.2: A summary of the findings of cycle two of the inquiry

	Use of LSM	**Teacher and learner use**	**Different ways of using LSM**	**Reasons why LSM are used**	**Reasons why LSM are not used**	**Evidence of learning and LSM use**
T2	Learning Programmes Waste Pack Activity Sheets Wise up on Waste, p5 & p20-22 All required LSM	Mostly by educator, learners could only use LSM with photos	To facilitate discussion Reference Plan activities Read about activity Get information	Appropriate Relevant Has information needed	Difficult concepts Inability to read Language	Ability to complete the questionnaire Identified sources of water pollution and answered educator's questions correctly Ability to do activities as expected Brainstorming and sorting of waste products Awareness of problems and suggested solutions

T 3	Learning Programmes Questionnaire Waste materials life story Local Grahamstown Waste Photos Landfill site questionnaire Black & White photographs	Educators and Learners	Studies photos Asked questions from LSM Answered Questionnaire and worksheets	Contain useful information Have clear instructions Encourage group work and investigation	Have alternative comprehensive LSM Difficulty to identify issues in unclear photos Difficult questions	Managed to complete waste audit questionnaire Collected different types of waste, sorted it, labelled it and did mathematical counts Identified water pollution sources answered educators ' questions correctly Able to do activities as expected Demonstrated awareness of waste problems and suggested solutions
T 4	Learning programmes Waste information sheets Pictures and landfill site questionnaires	Educators and Learners	Referred to the handouts Cut pictures to reflect situations	To get information about 3 Rs (recycle, reduce, re-use) To make work easier Understand difficult concepts Appropriateness of LSM to lesson	Not enough LSM Black and White Photos difficult for learners Language problem	Listed things they can do with waste Ability to informatively complete the landfill site questionnaire Ability to answer questions Made posters Completed mind map on waste material life story
T 5	Learning programme Waste information sheets Pictures and landfill site questionnaires	Educator	Read LP to prepare lesson Asked questions as put in LP	To gain more insights on environmental issues To understand better	Inability to read Language problem	Waste person and different types of waste

Having summarised the above findings, and resulting from the weaknesses of data collection approaches in the first cycle of inquiry, we collected examples of learner's work in this phase of the project. This led to the identification of two other categories that emerged in this analysis. These are related to the documenting of evidence of how the LSM may influence the outcomes of learning. We also focused more on the mediation role of the educator (see Table 4.3 below).

Table 4.3**:** Evidence of learning outcomes; educators' mediation role and the relationship to LSM

School	**Evidence of learning outcomes**	**Relationship to LSM**	**Mediation role**
School 1 (T5)	• Poster made of waste and written different types of waste in Xhosa • Collection of waste, labelling and mathematical counts • Made waste items (i.e. person, cars, invitation cards)	• The educator read the information sheets to get ideas on different types of waste and the learning programme to get the ideas for the activities to do in the classroom	• Educator explained to the learners what they were expected to do
School 2 (T2)	• Ability to answer educator's question and follow instructions • Collected different types of waste, sorted it, labelled it and did mathematical counts • Made waste items (i.e. person, cars, invitation cards) • Created songs and play on waste	• Educators used questions from the LSM to facilitate discussion, referred to the LSM for ideas for activities to do with the class which resulted in the learning outcomes being achieved	• Selected the relevant LSM that could be used by learners for the activity (LSM with pictures because learners could not read English) • Explained the LSM to learners where they could not interpret pictures
School 3 (T3)	• Managed to complete waste audit questionnaire • Collected different types of waste, sorted it, labelled it and did mathematical counts • Identified water pollution sources answered educator's	• The educators used the learning programme to plan the learning activity and learners interacted with supporting LSM like photos and others and through the educators and learners interaction	• Explain the LSM in a simple way and interpreted the LSM photos to learners

	questions correctly • Able to do activities as expected • Demonstrated awareness of waste problems and suggested solutions	with the LSM, learners achieved the expected learning outcomes.	
School 4 (T4)	• Listed things they can do with waste • Ability to informatively complete the landfill site questionnaire • Ability to answer questions • Made posters • Mind map on waste material life story	• When learners had difficulty in seeing what is happening in black and white photos, she encouraged learners to help each other. When learners had difficulty in understanding and completing the questionnaire, the educator explained it to the learners. As a result of the use of these LSM, the expected learning outcomes were achieved.	• Chose the suitable LSM • Encouraged learners to help each other • Explained and interpreted LSM for learners

From the above analysis, a clear relationship emerged between the learning outcomes achieved, the role of the educator in mediating learning, and the specific LSM used. This indicates the significance of a focus on the effective use of LSM in OBE; and the intimate relationship between the way in which LSM are used (by teachers and by learners) and the possibilities for achieving learning outcomes. As noted in the data collected and reported above, we focussed on the 'observable learning outcomes' (evidence of learning) – those outcomes that we could observe and which resulted directly from the use of the LSM in this research (rather than the outcomes reflected in the curriculum policy statements). We felt that this 'fine grained' analysis was more relevant to the research question; and that if we could identify observable learning outcomes (evidence of learning); we could see how the LSM would contribute to the achievement of broader curriculum outcomes, as stated in the curriculum policy documents.

Figure 4.5: Learners showing what they have done (scene 1)

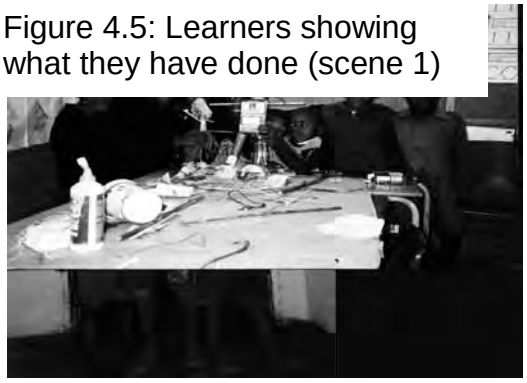


Figure 4.6: Learners showing what they have done (scene 2)

4.3.4. Reflection on the project activities and the research process in cycle two

Following the above noted processes involving a series of observations and implementation of activities, the support team met to consider the outcomes and issues associated with phase one implementation (cycle two of the inquiry).

4.3.4.1. Reflections on the LSM and project activities

Through the reflection process in this phase, we were able to note that:

- There is a tension between having presented a set of activities for educators to implement and their 'freedom' to develop their own activities (although they participated in earlier development of the LSM). While we wanted educators

to start to work more independently and start developing their own additional activities, it appeared that the learning programme unit has already 'framed' the process of learning and the activities to be done. In the learning programme unit, the supporting LSM were already suggested and provided. Even though we included an empty learning programme framework for educators to develop their own learning programme, none of them used it. Only one educator used additional LSM that she sourced herself. The structuring of the LPU and the provision of LSM influenced educators to do the activities as they are suggested in the learning programme.

As way to counteract this, we suggested that in the following phase of materials development we needed to design the LSM packs more as 'working documents', which would include space for the documentation of educators' ideas as well as for reflection and evaluation of the LSM. The need to include activities as "suggested activities", coupled with direct attempts to encourage educators to develop additional activities with less prescription was emphasized.

- We also noted that, while the active learning framework provided a useful planning framework, there was a danger that the way active learning framework is emphasized could result in a situation where it is regarded as 'the model' and as a prescriptive guide to developing learning programmes. This could result in a situation where it becomes the only way of doing things resulting in a process that could limit educators' creativity. We also noted this is the emerging trend in the CSW project. We acknowledged that we had suggested that the learning programme framework needed to be emphasized as an open-ended process to support learning and broaden understanding. But we also felt that we needed to highlight the point that the active learning framework was not the only way of doing things and that we needed to start to explore alternatives and re-emphasise the open-ended possibilities.

- We also seemed to be focusing too much on the processes of learning and were giving less attention to the 'learning about' or content. We therefore decided that in the next phase of the CSW project activities, we needed to focus on the importance of the content of what is being learnt to ensure more conceptual depth. To achieve this we needed to make sure that the process and the content is integrated in meaningful ways.

- In the activities we developed, there was little attention given to activity progression. That implied that the Intermediate Phase activities did not build directly on the activities in the Foundation Phase (although they did reflect increased scope and depth). The importance of activity progression was highlighted and emphasized. It was further suggested that the four elements of the active learning framework should be included (see Figure 3.1) and that in each element there should be a reflective process included, to encourage educators to reflect on the potential learning processes.

4.3.4.2. Reflections on the emerging findings

Through the reflection process we were able to note that it appeared that the LSM were accessible to the different phases. In the Foundation Phase, it appears that environmental education LSM were mainly used by the educator.

In the Intermediate Phase, it appears that both the educator and learners used the LSM. The literacy level at this Intermediate Phase is higher than at the Foundation Phase. However, it appeared that even though these learners could use the LSM, they had problems in using some of the LSM. This was attributed to the fact that some of the LSM were not clear and some of the questions asked in the LSM were difficult for the age level of the learners.

We also noted that learners could not use the LSM because they could not read or write. They lacked literacy skills, especially the Grade 1 learners. Recognising

that learners at the foundation phase are still learning to read or write we should not have expected them to have completely developed reading skills. We therefore felt that the use of pictures would be more appropriate to stimulate learning at this level. Realising that pictures alone might not result to the necessary learning we thought in the next phase we needed to emphasise the educators' role to mediate learning. We also reflected on the valuable role of LSM in providing the educator with necessary information and ideas to scaffold learning. In particular we noted that most of the educators felt that the LSM themselves were providing a valuable support for their teaching (for information, planning and providing learner activities and materials).

We also noted that learners struggled to use the LSM because they were not clear (e.g. pictures used). In responding to this we agreed that in the next phase of the LSM development we would try to ensure that the LSM are clear. This pointed to the need for good quality materials that were well produced.

In the second phase of the project, School 5 was not able to carry out the required activities for the project. They indicated that they could not use the LSM as they found it difficult to access. Educators could not identify the learning programme unit that provided them with the guidelines to pedagogical processes, fact sheets to provide them with more information on environmental issues, and such others. This, they noted, was due to the design structure of the learning support materials. We considered this carefully, and noted that we should research the implications of the format of the LSM in the next phase.

4.4. Cycle three of the inquiry

4.4.1. Reflection and planning

On the 5th June 2001 after realising that school 2, school 3 and school 4 had finished their activities by the end of May and that others were not yet finished,

we started to plan for the next phase of the project (Phase 2). As a way of planning the activities for the second phase of the project, we consulted with the schools and invited them to choose the focus of the next phase. We listed different choices on a questionnaire (see Appendix A12) and allowed a space for educators to add anything they felt might be missing on the list. I attended the health promoting schools meeting organised by the Provincial Department of Health where health issues were identified as a major issue to deal with in Grahamstown. Three of the participating schools were part of the Health Promoting Schools (HPS); and the HPS co-ordinator had participated in the pilot phase and first phase of the CSW project. In the HPS meetings it appeared that schools were faced with the following issues: water problems and sanitation issues. These issues were also reported by educators in the school profiles (see section 4.3.). The CSW project participants felt that developing learning programmes that would support the HPS programme to address environmental issues was needed.

After negotiation with other research participants, we decided that the focus of the next materials would be "Water and Health". On the 5th June 2001 the support team held a meeting to start planning for a materials development workshop and on 6th June 2001, Sogi, Glady, Lory and I started preparing materials that we would need for the workshop with the support of Southwood (a colleague with whom I was working as she was filling the position of Shady who was on leave at the time).

We wanted to develop LSM and learning programmes for the Foundation Phase, Intermediate Phase and Senior Phase with the project participants. On the 7th June 2001 we held a workshop at the Rhodes University Environmental Education Unit resource centre. The plan was that after the workshop we would refine the ideas and turn them into a resource pack. We were also planning to introduce educators to the open process active learning framework that provided orientation to the planning of classroom activities and thus the development and

use of the LSM. This workshop was attended by number of educators, NGOs, municipal officials and the Department of Health. We also planned to collect further data on the use of LSM during the workshop and a questionnaire to collect that data was designed by Lory (see Appendix A5 and Appendix A6) and was completed by all educators who were present at the workshop.

4.4.2. Project action phase

Though the planning and action phases of the project are presented as a linear process, in reality there were many overlaps. With the support of Glady and Sogi, I developed the first draft of the LSM. Because I had to go to KwaZulu-Natal to support and tutor on the Rhodes University/SADC International Certificate Course in Environmental Education before the LSM could be finalised, Shady refined and finalised the LSM with the support of Sogi and Glady. They then distributed the LSM to schools and educators involved in the project (see appendix B for samples of the Water and Health materials developed for the Foundation and Intermediate phases).

School 1, School 2, School 3 and School 4 were still participating in this phase, and at that time, it was only school 5 that had not started the activities for phase one of the project (see above). After schools received the LSM pack they started using the environmental education LSM to implement the project activities. The support team continued to visit educators and observe the lessons and to support educators where necessary. The support team also continued to complete the fieldworker reflection schedule. The fieldworkers, however, only focused on School 1, School 2, School 3 and School 4 for evaluation purposes, as School 5 appeared to be struggling to implement the project (as noted above). In this phase educators did not have to complete the same teacher reflection schedule (see Appendix A9) as in the previous cycle, instead they had to reflect at the end of each activity (see Appendix B for insight into how the educator reflection sheets were included in this phase of the project). The reason we

decided to change that method was that some of the educators (T2) struggled to complete the educator reflection schedule in the previous phase, and the support team felt that it might have been too long which created more administrative tasks for educators. As a way of encouraging educators to reflect on the use of the LSM, we put the reflection section (see Figure 2.3, and Appendix B) at the end of each activity sheet. I also interviewed educators involved in the project toward the end of the year as way of collecting data.

All schools finished only two of the activities out of five activities. There were number of reasons associated with this:

- Firstly, some educators finished their phase one activities before starting on the phase two activities;
- The materials development process took longer than expected and as result educators started implementing their activities during examination preparation time;
- Some of the educators were writing examinations to upgrade their qualifications, and could not complete the activities.

- **Findings from cycle three of the inquiry**

This section seeks to present the findings that emerged during cycle three of the inquiry. The findings are derived from the fieldworker reflection schedules, reflections of educators on the use of the LSM, and semi-structured interviews with individual educators. In analysing this data, the same analytical categories used in cycle one and two were used with some changes (see the headings in the sections below). In this cycle of inquiry, I report on the four cases together, and not individually as in section 4.3, as educators only completed two of the activities. The findings of this phase are reported below.

4.4.3.1. Perspectives on the use of LSM

The LSM referred to in the learning programme were used. In both the intermediate phase and foundation phase schools involved in the project, educators only managed to do two first activities with their learners out of five activities per phase (for reasons cited above). They therefore only managed to use the LSM associated with activity 1 and activity 2.

4.4.3.2. Perspectives on the importance of different kinds of LSM

In this phase, educators identified different LSM for teaching and learning to support different aspects of environmental education practice. Both the foundation (T2 and T5) and intermediate phase (T3 and T4) educators see the learning programme as the most important LSM for planning their activities.

All educators identified the information sheet as important for them to deepen their insights into environmental issues and to encourage learners to gain more knowledge. T2 and T4 also identified fact sheets as important LSM for conceptual understanding of environmental issues.

T2, T4 and T5 identified worksheets as important LSM for learners to use. They noted that worksheets encourage learners to interact with the learning support materials, and with the topic at hand.

4.4.3.3. Perspectives on why the LSM are used

As indicated in cycles one and two of this inquiry, different reasons influence the use of LSM. T2 and T5 used LSM because they are linked to outcomes-based education (OBE), are easy to use, and provide insights into issues that are not available in other materials in the school.

T3 notes that she used the LSM because they are simple to use, available, easy to understand and relate to the activity, and also reflect the daily experiences of learners. T4 notes that she used the LSM because they contain relevant information, clear photographs, and simple language and are familiar to the learners.

From the above, it seems that key reasons for the use of LSM appear to be related to convenience of use; relevance to the learners and the requirements of OBE.

4.4.3.4. Perspectives on educator and learner use of LSM

As reflected in cycle one and two of the inquiry, the intermediate phase LSM were used by both the educator and learners, and in the foundation phase LSM were used mainly by the educators. The reason for foundation phase learners lack of use of LSM is attributed to their literacy level and language. It also appears that Intermediate phase learners had better developed literacy skills and better language development.

4.4.3.5. Perspectives on why the LSM are not used

While both the foundation and the intermediate phase educators appear to have used all the provided LSM for the two activities, when asked to why they use certain LSM and not others, educators articulated different reasons.

T2 and T5 indicated that they do not use LSM if they are not relevant to the learning activities. Both T2 and T5 did not use LSM if the language used is difficult or not at the level of the learners or if in the context in which it needs to be used, learners have not developed literacy skills.

T3 identified the same issue as T3, namely the language and literacy level of learners. It also appears that T4 identified the issue of language and literacy as an issue influencing the use of LSM. However, T4 notes that one of the difficulties she experienced in using the LSM is the length of the story that is used to support the learning programme. It appears that T4 notes that the 'Sweet Water story' was too long and learners lose concentration, she therefore felt that the use of shorter stories would be useful in this regard. T4 further pointed out that her learners had difficulty interacting with the activity 2 pictures where they had to identify different uses of water. She attributed that to the learners lack of familiarity with the animals used in the pictures, therefore suggested the use of familiar pictures for the learners to be able to interact with the LSM. She further pointed out that she might not use the LSM if it is not legible, pointing to issues associated with the quality of production.

4.4.3.6. Perspectives on the effective use of LSM

Both the intermediate phase and the foundation phase educators effectively used LSM. The effectiveness has been determined by considering the educators' mediation roles, the learning outcomes and the relationship to LSM (see Table 4.3). This relationship appears to be critical to consider when researching the effective use of LSM.

In this cycle of inquiry we found that the educator's mediation role is important to enable the use of LSM in schools. In T5 and T2's class, learners could not read and understand the English language used in the LSM, T2 and T5 read the LSM and explained the LSM to the learners. And as a result of the use of the LSM T2 and T5 managed to plan their learning activities and facilitated learning. As a result of the use of LSM, it appeared that the expected learning outcomes were achieved. These include learners' understanding of the story and hygiene issues, which manifested in learners' ability to answer educators' questions in relation to

hygiene issues and an ability to do activities as expected and guided by the LSM. These findings reflect those in cycle two.

In T3 and T4's class a similar pattern is evident. Where learners could not understand the language used, the educators interpreted the LSM for them. In T4's class, learners could not understand the pictures because they did not know them; T4 explained the pictures to learners and encouraged learners to engage with pictures as suggested in the LSM. T4 felt that the information sheet was too long, so she summarised it for the learners. As a result of the use of LSM, T4 managed to facilitate learning and as a result the expected learning outcomes were achieved. The achieved expected learning outcomes include learning and understanding of the 'Sweetwater story', which includes an understanding of the relationship between culture and environmental issues and learners' understanding of pollution issues (see appendix B). As in cycle two of the inquiry, we focussed on the tangible evidence of learning outcomes, as these related to the activities and LSM provided in our observations, rather than on the specific outcomes in the curriculum policy statements.

4.4.3.7. Perspectives on different ways the LSM are used

When both the foundation and intermediate phase educators were asked to explain the different ways in which they used the LSM, educators used LSM differently in different situations (as in cycles one and two). Both foundation phase educators (T2 and T5) used the learning support materials like the LPU to plan and prepare their lessons. They also used the information section to deepen their insights and understanding of environmental issues. They read the LSM learning programme and information sections components.

Like the foundation phase educators, intermediate phase educators (T3 and T4) read the LSM to plan and prepare their lessons and to deepen their insight into environmental issues. T4 and T3 further encouraged learners to also use the

LSM information and activity sections. T3 and T4 used the LSM to facilitate learning by asking questions as suggested in the LSM. As arranged in the LSM, educators completed the reflection section and this was used to evaluate and reflect on the environmental education activities and learning support materials they were using.

In general, the findings of this cycle of inquiry reflect the findings of cycle two of the inquiry. In addition to the findings in cycle two of the inquiry, we were able to gain more in-depth understanding of which LSM teachers used for what purpose.

4.4.4. Reflection on the cycle three project activities and research process

Through reflections, we noted that the process of LSM development in this phase took long and therefore the activities had to start in the 4th term of the year to be implemented in the classroom. During this time educators only managed to finish two activities out of five or six activities per phase.

Having noted that a reflection schedule proved useful in the second cycle of this research, but that it was too long we realised that including a reflection section after each activity enabled educators to complete reflections after each of the activities. This seemed to be a better way of encouraging reflection on action. As I reflected on the research findings however, I noted that the reflection section might not provide enough guidance in terms educators response as they relate to the objectives of the activities and the learning process. One might need to include broad questions to guide teacher reflections.

We also noted that there was improvement in educator use of LSM, that educators used all the required LSM and completed all the required sections in the LSM. This, we noted, could be a result of increased familiarity with the types of LSM and the OBE activities I noted, however, that the reoriented learning programme could have some limitations in terms of providing support for

learning. The LPU did not have much information on the associated and additional LSM and thus limited educators' role in selecting the LSM.

4.4.5. Summary of cycle three of the inquiry

In this cycle of inquiry, we drew on, and tried to respond to issues raised in cycle one and cycle two. This cycle focused on the development of 'Health and Water' learning support materials (see Appendix B). Informed by a more open process orientation to the active learning framework, these LSM took a new, less rigid format (note that appendix B is the 'final' version of the LSM we produced in the CSW project, using this format). We developed the LSM for the Foundation phase and the Intermediate phase. This LSM was collaboratively developed by all the research participants, including the educators involved (see section 3.5.). This LSM consisted of a learning programme, information and activity sheets and a reflection section where educators would reflect after each activity. To monitor or evaluate this cycle of inquiry, we used the reflection section in the LSM, semi-structured interviews with individual educators and examples of learners' work. In this cycle educators only managed to finish the first two activities. Educators could not finish this phase because it was the beginning of the fourth term and fell into the end of year examination period at schools. Indicated in this cycle is that LSM were used by educators for planning, as reference material and to gain deeper insight into environmental issues. This cycle indicated that educators used the LSM because they are linked to OBE, easy to use, and they relate to the classroom context. Learners' literacy and language levels, as indicated in cycle two, still appear to be among the reasons for a lack of use of LSM by learners, especially in the foundation phase. Educators also indicated that LSM should be legible for educators to be able to use it. Clearly notable in this cycle is that the findings are similar to the findings that emerged in cycle two.

4.6. Concluding summary

As indicated in section 1.2, the goals of this research were to explore the use of LSM, establish which LSM are used or not used by educators and the reasons why, and to explore ways of supporting educators to implement environmental education processes in C2005 in the context of the CSW project. The aims were to improve the LSM used by educators, and to make recommendations on the kinds of support educators need to be able to use LSM in the context of C2005. In cycle one and cycle two of this study, I focused on the use of learning support materials on waste issues and in the third cycle of inquiry the learning support materials focus was on 'Health and Water' issues.

In all the three phases of this study, it appears that that the purpose has influenced decisions to use the LSM. The main purposes that influenced the decision to use the LSM included the curriculum development, OBE requirements and to gain more insight into environmental issues. In both the pilot phase and phase one educators used the LSM as a reference, to access information and to read about the activity. In phase one and phase two educators used LSM to plan their lessons and facilitate discussion. Findings in all three phases indicated that to improve the use of LSM, educator's mediation role is important. In all these phases of the CSW project, this study was focussed on the role of educators as interpreters and designers of the LSM.

This chapter indicated that the support provided to educators was different in different cases. The support role included: provision of LSM; support through workshops (professional development opportunities); support for classroom management; support for curriculum planning and providing feedback to educators after the lesson. In the next chapter I review the research findings presented in this chapter in relation to the contextual issues and research findings reported in Chapter 2.

CHAPTER 5

A REVIEW OF THE RESEARCH FINDINGS AND RESEARCH PROCESS

5.1. Introduction

In this chapter I will discuss the Chapter 4 findings. Drawing on the findings in Chapter 4, and through a 'third layer' of data analysis in which I analysed the findings of Chapter 4 in more depth (see section 3.7), I have identified the following areas for further discussion, namely indicators for effective use of LSM, the influence of purpose on the use of LSM, the way different types of LSM support the curriculum, the significance of mediation processes in the use of LSM and how the design of LSM influences learning. I will also reflexively review the support processes and research processes employed in this study.

5.2. Indicators for the effective use of LSM

In the review of a number of different studies on the use of LSM (see Chapter 2), none of these studies were able to highlight indicators used to identify the effective use of LSM. However, Lotz (1996) and Murray and Wilmot (2000) noted occasions where LSM were successfully and effectively used. One of the important findings of this research is the identification of some indicators that may be used to guide further inquiry into the effective use of learning support materials. These include:

- use of required LSM in a particular lesson;
- LSM that provide both teachers and learners with information and guidance;

- after reading the LSM, learners being able to answer the questions posed by the educator;
- educators' ability to explain the LSM well;
- learners being able to use the LSM without asking questions (of clarity);
- learners' being able to respond well to the LSM;
- flexibility in the design of the materials, so that educators can use them in different ways, according to purpose;
- and LSM that are designed to meet the curriculum requirements.

A further possible 'indicator' for the effective use of LSM is the **relationship** between learning outcomes, the mediation role of the educator and the specific LSM used.

These indicators were identified through an analysis of the pilot phase, and first and second phases of the CSW project. They did not, however, form a key focus of the research. Further research into the use of these indicators in different settings will therefore be required. In particular, further and more in-depth exploration of the relationship between learning outcomes, the mediation role of the educator and the specific LSM used would seem necessary.

5.3. How the purpose influences the use of LSM

This research clearly highlighted that purpose has an influence in the decision to use LSM. Purposes affecting the use of the LSM in this study include:

- Curriculum development;
- Growth in knowledge and understanding of environmental issues; and
- The requirements of outcomes-based education.

These are discussed below:

5.4.1. Curriculum development

One of the important purposes for the use of LSM is to support curriculum development processes. For example in this study teachers used LSM to plan their lessons (see sections 4.2.3, 4.3.3, 4.4.3) and because they were seen to be relevant to the curriculum or activity (see section 4.3.3). For example, T2, T4 and T5 read the LSM and used that information to plan their lessons.

Similar findings have also emerged from other research projects. The DoE regards adequate LSM as an integral part of curriculum development and as an important means of promoting good teaching and learning (see section 2.7.). The DoE also emphasize the importance of LSM in the design of the curriculum (see sections 4.2.1, 4.3.6). This focus on LSM is significant in relation to the point raised by the DoE research that one of the reasons educators could not use LSM effectively was because the LSM were not appropriately aligned with the curriculum. Similar findings that also indicate the intimate link between curriculum development and learning support materials emerged from Lotz's (1996) research. She highlighted the relationship between curriculum development, learning support materials development and teacher professional development, and indicated that teachers used LSM to support their curriculum and lesson planning. The NEEP-GET pilot research (Lotz-Sisitka & Raven, 2001) also indicated that educators used the LSM because they contained relevant information in relation to the environmental foci in the learning areas. This study further indicated that educators were anxious about the resources that are required to support the curriculum work (see section 2.7). In the Learning for Sustainability Project researchers found that where educators were unable to use LSM effectively, curriculum planning was superficial, leading to superficial learning outcomes (Lotz-Sisitka & Olivier, 2000).

The important link between the use of LSM and curriculum planning was highlighted in the CSW project through the way in which educators used the learning programme units as a basis for the use of the LSM, and for their lesson

planning (see sections 4.4.2.2, 4.4.3.4.4, 4.5.3.7, 4.5.3.2). This indicates the need for LSM that are specifically designed to be used in relation to the curriculum requirements, as well as providing educators with support for curriculum planning (lesson planning) in local context. The study also highlighted the intimate relationship between the LSM used and learning outcomes (evidence of learning). While the observations in this study were not specifically directed at establishing which of the C2005 policy outcomes were being achieved, it focussed on establishing in principle, whether the use of LSM would result in learning outcomes (evidence of learning). Given that schools are required to implement an OBE curriculum in the form of C2005; it would seem important that this link between learning outcomes (as curriculum requirement) and LSM use should be explored in more depth in future research.

5.4.2. Growth in educator knowledge

A further finding of this study is that educators use learning support materials to extend their own knowledge and understanding. In this study a number of the educators used the LSM because they wanted to get more insights in environmental issues and to develop their own understanding of these issues (see Chapter 4). It therefore seems important to provide the kind of learning support materials that provide this kind of support to educators. In the CSW project, educators used the fact sheets and information resources for this purpose.

This finding is reflected in a number of other research projects (see Chapter 2). For example, the NEEP-GET pilot research indicates that the selection, development, and adaptation of LSM should be undertaken in ways that suit the contexts in which educators work to broaden their knowledge and experience of environmental issues (see section 2.7.1). The NEEP-GET pilot research study further indicates that LSM enabled better understanding of environment issues, environmental education processes, and integration of environmental foci in the

curriculum. The DoE research findings also indicate that teachers use LSM to support or access relevant or existing knowledge (see section 2.7.3). In the context of the CSW project information sheets and fact sheets appear to have provided useful insights in environmental issues.

5.4.3. Outcomes-Based Education requirements

The last important purpose that appears to have influenced the use of LSM in the CSW project, it is linked to the requirements of OBE (see Chapter 4) and the ability of the LSM to promote outcomes based education. For example, in the first phase of the CSW project learners were asked to work in groups and collect rubbish and count how many items of a particular waste type was collected. They were doing this in groups. And when learners visited the landfill site they were working in groups to identify issues to record (in their investigation) and the worksheets provided questions that guided their observations. This in some ways supported learner centred approaches (by encouraging learner interaction and investigation) and met some of the OBE requirements.

A similar finding has also emerged from other research projects. For example, in the NEEP-GET pilot research Lotz-Sisitka and Raven (2001) indicated that LSM provided practical ideas for implementing OBE learning programmes in school contexts (see sections 2.7.1.). The link between LSM and outcomes based education has also been confirmed in the DoE research findings which indicated the difference in the teaching practices in well resourced and under-resourced schools (DoE, 2001a). This research indicated that well resourced schoolteacher practices are closer to OBE practices and in contexts where there are no / few / limited LSM teaching practice is inevitably teacher centred. OBE proposes an orientation to teaching and learning that is learner centred and encourages group work, and learner interaction. The role of the educator as a facilitator or mediator of learning is emphasised. This study indicated that the LSM in the CSW were designed to enable learner investigation and action taking

(see section 2.6.2) and were used to encourage group discussions, investigations and action taking. In these activities, educators were required to facilitate / mediate learning.

These findings indicate the importance of designing LSM in ways that support learner-centred education. In the CSW project we designed worksheets for the learners to use in fieldwork; and we used picture-resources to enable group discussions. These LSM therefore enable a learner centred approach. For example, learners were working in groups during the landfill site visit and were recording observations on their own. The landfill site questionnaires provided them with questions to guide their observations as a group. Other similar evidence is the use of an audit questionnaire that provided questions to guide learners' observations, and learners used it to record their observations without the direct support of the educator. The learning programmes included in the LSM provided the educator with space to plan for group work and plan actions on their own (see Table 2.1 and Figures 2.2, 5.1, 5.2, 5.3).

While not a key focus of the study, the study seems also to have indicated that LSM have the potential to help educators to create links between the learning outcomes and assessment. For example the LSM included a section on how learning outcomes could be assessed and provided a space for educators to add their learning outcomes and assessment statements (see Figure 2.2). While this study did not focus on the use of LSM in assessing learning, from the evidence of learners' work collected (see also the evidence of learning outcomes documented in Table 4.3, Figures 4.4, 4.5, 4.6), it is clear that there is a link between the use of LSM, learners work and what can be assessed. This is also an area that could be explored in more depth in future research.

Figure 5.2: Learners working in groups and the educator facilitating

Figure 5.3: Learners working in groups

5.4. How different types of LSM supported the curriculum

In this study three main types of LSM were used (see Chapter 4). These included illustrative learning programmes, fact sheets/information sheets (like the recycling fact sheets, and others); and fieldwork activities which supported

investigations or action taking (e.g. the worksheets to encourage investigation at the landfill site).

The illustrative learning programme provided guidance in the interpretation of the curriculum. For instance, it provided guidance to educators to plan the lessons, learning outcomes and assessment. It also provided pedagogical ideas for implementing of educational activities so that they would be aligned with the requirements of OBE (see above). Like in the NEEP-GET pilot project (Lotz-Sisitka & Raven, 2001), the CSW learning programme units provided useful orientation to the planning and implementation of investigation activities, action-based activities and reporting activities (see Table 2.1). The active learning framework also provided a planning tool for educators, which was used during the workshops to plan the LPU's and select the LSM for further development by the support team (see section 4.2, 4.3, 4.4).

Information or fact sheets were provided to educators to support the learning programmes. They provided educators with additional background to the waste issues (see above). These materials provided educators with conceptual and content knowledge, which they were able to draw on in their lesson planning (see sections 4.2.3, 4.3.3.1, 4.3.3.2, 4.3.3.3, 4.3.3.4, 4.4.3).

The fieldwork activities (e.g. worksheets to support investigation at the landfill site) formed the third type of material provided in the CSW project. These LSM were critical in supporting the learner-centred focus of the OBE curriculum. Through using these LSM in the field, learners were able to undertake activities that were appropriate in scope and depth. The worksheet had questions that guided learners' observations. In the landfill site learners had to work in groups, and each group had to fill in the landfill site questionnaire. Working in their groups, learners had to give their observation answers through responding to the questions in the landfill site questionnaire. Through this learners learnt about the importance of landfill sites. This would seem to be an important dimension to

consider when designing LSM, given that previous studies such as the NEEP-GET pilot research project (Lotz-Sisitka & Raven, 2001) found that educators often use the easy materials; or that there are not enough LSM to support learner-centred approaches (Vinjevold, 1999). This is particularly important for environmental learning, as the learning is often contextual, and issue-based (see section 2.6.3); and thus involves active approaches to learning (see section 2.6.3). LSM therefore have the potential to provide the tools for local investigations and action taking.

5.5. The significance of mediation processes in the use of LSM

During 1998 the government released a policy document articulating the norms and standards for educators. According to the 'Norms and Standards for Educators' policy statement (RSA, 2000a), educators are required to demonstrate applied competence in the role of interpreter and designer of learning programmes and materials. This study indicated the importance of the educator's mediation role in enabling the effective use of LSM (which includes contributing to the design and interpretation of LSM). This study focused on educators roles as 'interpreters and designers' of LSM in all three cycles of the inquiry (see Chapter 4). The action research process appeared to be central in enabling educators to play this role in the context of the CSW project (see Chapter 4).

More specifically, this role involved educators interpreting provided learning programme units, designing adapted learning programmes, and selecting and preparing suitable textual and visual resources for learning (RSA, 2000: 13). These competencies are consistent with those outlined in the 'Norms and Standards for Educators' document. In this study teachers also explained different concepts and information to learners and they also explained and interpreted LSM for learners. They also had to select those learning support

materials that were appropriate for the age and language competence of the learners (see sections 4.4, 4.5).

This study therefore provides some perspective on the role of the educator as 'mediator of learning', particularly as this relates to their role as 'interpreter and designer of learning programmes and materials'. The study illustrates the close link between these two roles; and indicates that the use of LSM is an important dimension of mediating learning.

The importance of teachers' mediation role in relation to the use of LSM also emerged in DoE research findings (Vinjevold, 1999), Lotz's (1996) PhD research and Murray and Wilmot's (2000) research in Namibia. Wickham and Versveld's research (cited in Vinjevold, 1999) indicates that individual educators rather than the materials used are a significant determinant in the materials/practice relationship. Taylor (in Lotz, 1996) argues that the use of LSM to bring about social change is a myth. While he (ibid) recognises that LSM may be able to support better educational processes, as a technology (the LSM) can never direct social change. This implies that the teacher's role as mediator in the classroom is a significant facet of LSM development and use. Murray and Wilmot (2000) also indicated the importance of the mediation role in the use of learning support materials. Their research indicates that educators had to adapt LSM to suit their learners' language competence, especially where they identified language problems associated with learners' ability to use the LSM. They note that the teacher had to scaffold the learner. This finding is reflected in the CSW project, where educators often scaffolded the learner's use of the LSM. To do this, educators had to pose questions to learners and advise them how to find information in the LSM. In some cases, they translated aspects of the LSM for learners. This encouraged learners to use the LSM. The learning programmes and some of the activities in the LSM provided questions that educators could ask learners to guide learners' activities (see Table 2.1). As noted in section 2.6.3, scaffolding is an interactive process in which an adult adjusts both the

amount and type of support they offer a child, eventually leading to skills being taught.

The strong relationship between the educators' mediation role and the use of LSM finding is important for materials developers and teacher educators. In particular the specific competences that are required for teachers to effectively fulfil these two roles needs to be more carefully considered. This study did not explore this in depth, but the findings of the study have clearly outlined this relationship.

5.6. Design of LSM and learning

One of the important findings of this research is that the design of learning support materials influences the way LSM are used, and therefore the learning processes and learning outcomes that result. This will be reflected in the following sub-topics: -

5.6.1 Active learning processes

This study indicated that the active learning framework influenced the learning processes and learning outcomes (see sections 2.6, 4.2, 4.3, 4.4, and Table 4.3). Lotz-Sisitka and Raven (2001: 94) note that responding to environmental issues and risks requires knowledge and skills best developed through active learning, critical thinking, involvement in real issues, and encounters in the learners' immediate environment. The active learning framework described in section 2.6 provided useful guidelines for the design of the LSM, and thus for classroom learning processes and learning outcomes.

For example, the illustrative learning programme described in section 2.6.2, encouraged educators to mobilise learners' prior knowledge through scaffolding questions (see Figure 2.1 activity 1 and Appendix B). It also encouraged

learners to undertake investigations, for example in the activity that required learners to go into the school grounds and identify waste that is available in the school grounds (waste auditing). Learners were asked to collect these different types of waste and count which waste type is more prevalent in the schools grounds. Learners were also encouraged to engage in local action, as illustrated in the activity 3 in this learning programme, which required learners to collect waste from their surrounding communities and use it to create waste items e.g. waste sculptures, waste person and such others (see Table 2.1).

Thus, educators participating in the CSW project, were encouraged to draw on learners' prior knowledge, and were guided by what O'Donoghue (2001: 7) referred to as a set of "common sense questions", which provides scaffolding to foster learner enquiry and problem solving around local environmental issues or risks. (see Figure 2.4). Educators were encouraged to apply this framework by asking questions from the learners, and by deciding on different kinds of activities. In describing how this framework was applied in the NEEP-GET pilot research, Lotz-Sisitka and Raven (2001) note that this framework involves a mix of environmental education processes that enable learners to find information 'about ' issues; investigate issues 'in' the environment; and take action 'for' a better environment (see section 2.7.1)

In the CSW project learners were encouraged to work in groups as way of encouraging information sharing and to also look at the information sheets or facts provided in the CSW LSM packs, to find more information. In the CSW project learners were also encouraged to explore environmental issues 'in' the environment (see above descriptions of the LSM that encouraged learners visit the landfill; and the LSM that encouraged learners to visit the local streams for water quality testing).

The findings of this research project therefore indicate that in order to support environmental learning processes, a range of activities (and associated LSM) are

required. These involve LSM to support information finding; LSM to support investigations 'in' the environment; and LSM to enable action taking and reporting. It seems important to provide a mix of LSM to encourage environmental learning processes that are actively oriented towards responding to, and investigating local environmental issues in context.

5.6.2. Language and literacy

Another LSM design issue is language. One of the important findings of this research is that learners were not able to use the LSM in some cases, as a result of the language used in the LSM, and their literacy level. I will discuss this finding in more detail below:

5.6.1.1. Language and the use of LSM

This study indicated, in each of the action research cycles, that language (used in the design of LSM) is one of reasons why educators and learners did not use the LSM (see sections 4.4.3.2.3, 4.4.3.4.2). The CSW learning support materials were written in English. All schools participating in the CSW project, however, use English as their second language. Several studies in the PEI research also indicated that language competence inhibits the use of LSM (Vinjevold, 1999) and further suggests that the low level of language competence among learners meant that they found textbooks too difficult to read. Such findings have emerged in other research studies, for example in Lotz (1996), Lotz-Sisitka and Raven (2001) and the Learning for Sustainability Project. Lotz-Sisitka and Raven (2001) indicated that teachers use 'easy materials' which do not need much reading or further research. In this study both the KZN and Mpumalanga province researchers indicated that language could be an issue associated with the use of 'easy' materials.

As indicated in Chapter 4, CSW project learners speak either Afrikaans or isiXhosa as their primary languages. One school used Afrikaans as their primary

language and all others used isiXhosa as their primary language. Section 2.6.3 outlines that OBE draws on constructivist learning theories, and constructivist approaches to teaching. Significant to this study is the fact that many of the activities described above, involve active participation of the learners, and this involves the use of language to discuss, ask questions and make sense of things. Murray *et al* (2000) note that languages have implications for how the LSM are interpreted, produced and used. They (*ibid*) note that materials intended to help educators understand Curriculum 2005 and put it into practice are almost exclusively in English. Their study implied that providing LSM in languages other than the primary language creates problems with regard to young children learning to read (Murray *et al*, 2000). It also creates an additional burden for educators who have to translate (as experienced in the CSW project). Vinjevold (1999: 215) notes that the *de facto* policies and practices of schools are influenced by perceptions of the value of English as a language of socio-economic power and mobility. In the CSW project we noted that educators often had to translate activities for learners; putting extra pressure on the educator's mediation role (see sections 2.7.4, 4.2.3, 4.3.3, 4.4.3). In addition, particularly the foundation phase learners were unable to use the LSM themselves, and were heavily dependent on the mediation role of the educator to use the LSM, as the materials were not provided in their primary language, and in some cases the learners had not acquired the necessary literacy skills.

5.6.2.2. Literacy and the use of LSM

This study indicated that literacy levels also influenced the use of LSM in the CSW project. In this study, we discovered that most of the foundation phase learners could not use the CSW learning support materials because they could not to read and write (see Chapter 4). Czerniewicz *et al*, (2000: 53, citing Taylor & Vinjevold, 1999: 233) notes that "… before learners can develop the cognitive skills necessary for the sophisticated levels of literacy required by curriculum 2005 – critical literacy, information literacy and so on – they must be able to read

and write". This issue of the importance of literacy in C2005, was acknowledged by the Minister of Education at a three day Pan African Conference on children's reading when he said: "The dismally low reading skills of South African pupils is a major cause of overall schools failure and drop-out." (Asmal, 5 August 1999 cited Czerniewicz *et al,* 2000: 53).

The Learning for Sustainability project research further indicated that even educators appear to have poorly developed literacy skills, and have little experience in finding information from a range of learning support materials. Similar findings also emerged from the DoE research (Vinjevold, 1999) that indicated that poor levels of reading competence amongst teachers cause misunderstanding of texts and an inability to interpret signs.

In the CSW project we did not find that the educators had much difficulty in reading and using the materials, but we did find that as the project developed, increased familiarity with the materials improved their use (see Chapter 4). This study, however, points to the significance of ensuring that LSM are appropriately designed with learner's literacy skills in mind; and in their primary language. In addition this study indicated the important role of educators in mediating learning, particularly when learners experience language and literacy problems.

5.6.3. Prescriptive and open-ended approaches to professional development

In the CSW project there we experienced a tension around open-ended approaches to professional development activities. Critical theorists and constructivists are among those who recommend that professional development processes should be negotiated with the learners (in this case the educators involved in the CSW project); and be responsive to the contexts in which learners / educators work (Janse van Rensburg & Lotz-Sisitka, 2000:54; see also Chapter 3). The meetings and workshops organised in the CSW project, and the

relationships we established with educators in the CSW project allowed the opportunity for discussions and negations in the project. This provided an opportunity for educators to decide on the focus of the learning support materials. Whilst educators were able to contribute to the project in some ways (such as helping to select materials and deciding on the focus for the LSM); there were other areas that were not as 'open-ended'. For example, the use of the active learning framework was 'pre-determined' by the CSW project's relationship with the NEEP-GET project; and the learning programme units and materials were finalised by the CSW support team. Educators in the CSW project, however, expressed their satisfaction with the LSM, as they were 'easy to use' and 'appropriate to the curriculum and learners needs'. We therefore found that a 'balance' of open-ended processes and more structured or pre-determined approaches helped us to develop materials that were suitable to the context. An important dimension of this, however, was the ongoing reflections in action, and our reflexive orientation (see Chapter 4).

In the next section, I review the importance of providing support within a reflexive orientation, as a way of providing further insight into this dimension of the findings.

5.7. Support processes, reflexivity and research

Koch (1998) notes that reflexivity, in its various guises, occupies a central place in participatory action research. Janse van Rensburg (1995) identifies a reflexive orientation to environmental education research in which social processes of change are regarded as a focus for research. She (Janse van Rensburg, 1995:14) sees a reflexive orientation to be concerned with broad processes of social transformation through "…critical and contextual review and action". As

noted above, and in Chapter 4, this study highlighted the importance of reflexivity in improving the professional development support processes and the LSM provided to educators in the CSW project. Reflexivity was therefore an important dimension of the ongoing research process as well (see Chapter 4).

Like Lotz (1996: 206), I have noted that the concept of reflexivity provided useful conceptual tools for the gaining of further clarity on the emergent Issues. Reflexivity involves "…critical self reflection both of the researcher him/herself and the effect that s/he has on the research process…" (Bozalek & Sunde, 1993/4: 78, cited in Lotz, 1996:206). Findings in the Learning for Sustainability project indicate the importance of reflexivity amongst teacher educators and professional development practitioners, particularly when working in in-service professional development at a local level. In the Learning for Sustainability project, Lotz-Sisitka & Olivier (2000:96) recommend that professional development practitioners (such as the support team in the CSW project) should be able to reflexively review their own competencies and orientations in supporting educators in their work. They (*ibid*) indicate that, in the Learning for Sustainability project this involved clarification of a theoretical framework, hence my emphasis on the theoretical framework guiding this study in Chapter 2 and 3.

5.7.1 A reflexive review of the support processes in the CSW project

In this section I reflexively review the support processes and research processes. The reflective sessions, which formed part of the ongoing action research process (see Chapter 4) enabled the support team to have regular meetings with each other, and with the educators concerned, and to provide feedback to research participants. We were able to apply these reflections in ongoing cycles and in the revisions of the materials. For example, we noted that we needed to reflexively review the role of the support team members in schools (see section 4.2), and we suggested that in the next cycle of the project the support staff

needed to ensure that they did not to replace educators, but rather find ways of supporting the educators more effectively.

In the case where educators could not use the LSM because they did not have photocopying papers, we improved our support by providing one-sided paper. We further advised them to keep one-sided papers in their schools, which also enhanced the use of LSM. This study indicated that at times, educators were not able to use the LSM because they are not familiar with it. Through reflexive processes we able to respond to that by encouraging teacher participation in the design of LSM which provided them an opportunity to familiarise themselves with the LSM. One issue that we did not respond to, although the finding was reflected in both of the earlier cycles of inquiry was the issue of language and literacy. We did not translate the LSM (for use by learners) into their primary language, due mainly to logistical and time constraints.

When we learnt that some of the research strategies used in cycle one of the inquiry were not providing answers that we are thought are important in improving the LSM use, we tried to improve these. For example, in phase one we changed the research strategy to accommodate teachers' perspectives and to address the issues we had raised in reflecting on the pilot phase. In the second cycle, we improved our research practice by providing teacher reflection schedules that accommodated teacher perspectives. When we reflected on the earlier research processes, we learnt that the fieldworkers had problems completing the observation schedule, I then provided support to the fieldworkers. I mentored them in completing the observations schedules. We also noted that educators could sometime not complete the teacher reflection schedule during cycle two because it was too long. In the third cycle we developed the LSM with the teacher reflection section following the activity (see Figure 2.4 and Appendix B).

Another example of reflexivity emerged when one school could was unable to use the LSM because they could not find their way through the LSM. We went to the school to orientate educators to the LSM even though we were not successful. Drawing on this experience, we redesigned the LSM to support educators to use the LSM, and provided an orientation section in each LSM pack.

The above reflexive review of the support process indicates clearly that our ability to reflexively review our support role, and the LSM as they were being used, was closely linked to the action-reflection process in the action research design of the research process.

5.7.2 A reflexive review of the research process

In this section I review the research process. In doing that I will look at the research design decisions in relation to the action research cycles that are described in Chapter 4. In Chapter 3 I indicated that I chose participatory action research, informed by critical theory because of my belief that research in environmental education should be responsive to curriculum issues and problems within the context in which they take place. In line with that belief this research was able to respond to curriculum issues and problems in the contexts in which they took place. For example, the study was trying to respond to environmental problems prominent in Grahamstown, and in the schools in which this study took place. The phase one LSM responded to waste issues (see section 4.2.1.) and phase two LSM responded to water and health issues (see section 4.5.). These are the issues identified, and explained in the school's contextual profiles (see section 4.3.3.1; 4.3.3.2; 4.3.3.3; 4.3.3.4, Appendix A7). They were also issues that were identified in a community context, in consultation with other stakeholders in the Grahamstown community.

The study was also able to respond to curriculum issues. Current curriculum issues include integration of environmental learning in the curriculum; and implementation of learner-centred approaches to outcomes-based education (discussed in Chapter 2). In this study, and through the participatory action research methodology, we were able to support the implementation of environmental learning programme's that were appropriate to the OBE curriculum requirements, through our focus on the development and use of LSM (see sections 2.5. and 2.6.).

A further justification for employing participatory action research informed by critical theory, was that I wanted to employ a research process that is grounded in democratic values and which provides space for participation in the research process (see section 2.7. and chapter 4). Like Lotz (1996) I have sought to provide an enabling orientation with the focus on the involvement of educators in the use of LSM, curriculum and LSM development, review and improvement of LSM, and evaluation of the use of LSM (see section 3.2.3.3.). As indicated in chapter 4, the research design of this study has enabled the above interactions to take place. For example, educators participated in the negotiation of data analysis (see section 2.7.) and all research participants participated in the research process of this project. These included reflecting on the actions taking place in the project; negotiating aspects of the data analysis contributing to the evaluation process. Support team members were able to participate by drawing on a range of research techniques such as filling in observation schedules and collecting evidence of learners work. I was able to participate in the research process through rigorous documentation of the research processes; negotiating the route with other participants; writing a reflective journal, and participating in ongoing reviews of the LSM (see section 4.3.1.)

I employed this research design because I assumed that it would contribute to teacher professional development, the support team's professional development and my own professional development. These intentions emerged as I reviewed

the literature on critical theory and participatory action research. Blyler (1998), for example, indicated that critical theory aims at empowerment and emancipation (see section 3.2.2) I believed that through interaction with the research participants this assumption would be fulfilled. In adopting this research design, the CSW project has been able to contribute to educator's professional development and particularly to the professional development of the fieldworkers especially Sogi and Glady. This research provided learning opportunities for the educators to grow professionally through workshops, classroom based support and self reflection (see chapter 4). Through this research participants participated in materials development, evaluation, review of LSM, and the use of LSM. This provided an opportunity for research participants to grow in their professional role. I have grown in my role as teacher educator, and materials developer (as is evidenced through the improvement of the materials development designs – see Appendix B and Chapter 4).

Through this research, the support team and I were able to improve our support to educators and improve our skills as researchers in the context of the CSW project (as evidenced in the changes in the research processes as result of reflections on the ongoing research process, and the improved design and use of research techniques, see Chapter 4). Through this research educators' roles in the use of LSM, materials development, and interpretation of LSM seem to been developed (see Chapter 4) and their participation in the CSW project has also deepened their understanding of environmental issues and curriculum issues and their ability to reflect on their practices has been enhanced (see the findings of cycles one, two and three, reported in Chapter 4).

In justifying the research methodology employed in this research, I argued for the use of participatory action research as it bridges the divide between research and practice (see section 3.2.3.1.). This study confirmed the point made by McNicoll (1999) that the findings of action research are fed back into the practice with the aim of bringing about social change. This is in line with the Prasad and Caproni

(1997) argument that critical theory is committed to praxis (action to bring about change). In Chapter 4 of this study, it is clearly indicated how the findings from each cycle of inquiry informed the following cycles of inquiry and how the issues raised in each cycle were taken forward in the next cycle of inquiry (see Chapter 4).

In this study I have drawn on the work of Lotz (1996) who argues for reciprocity in praxis-oriented research, which implies a mutual give-and-take, mutual negotiation of meaning and power. I became conscious of power relation issues early on in the CSW project, and followed Lotz's (1996) suggestion for ensuring relationships of trust and mutual understanding in the project. I did this by respecting the research participants and being honest and transparent with the research participants. Lotz (1996) argues that a consideration of power relationships is important if research is to be meaningful and socially transformative (see section 3.4.).

5.8. Conclusion

This chapter has taken forward the data analysis and the findings presented in chapter 4 of this research. In taking this analysis forward I have reported on some of these indicators may be useful in guiding further research on the effective use of LSM. These emerged in cycle one of the inquiry, and we were able to refine them in cycles two and three. I have also discussed how purpose may affect the use of LSM. In particular, I discussed how the need to develop the curriculum, to gain more knowledge and meet OBE requirements, influenced the use of LSM in the CSW project. I have also discussed how different types of LSM supported the curriculum, and the significance of mediation processes in the use of LSM. This chapter also reflected on how the design of LSM may influence learning processes and learning outcomes. In particular, I reviewed how the use of an active learning framework influenced learning processes; and how language and literacy issues affect the use of LSM and hence the

associated learning processes. I also reviewed the significance of keeping a balance between prescriptive or structured processes and the need for open-ended interactions in professional development settings; and in the design and use of LSM.

I have reflexively reviewed the support processes in the project, noting the significance of reflexive orientations in action research; and I have also provided a reflexive review of the research process by considering the research design decisions, as reported in Chapter 3 in relation to the research findings and research outcomes (as reported in Chapter 4, and in this chapter). In the next chapter I provide some recommendations for future research projects such as this one, with an interest in exploring the use of environmental LSM in the context of C2005 (or OBE) in schools.

Chapter 6

SUMMARY AND RECOMMENDATIONS

6.1. Introduction

In Chapter 2 of this study, following the review of available research into the use of LSM in the context of C2005 I indicated that this area of curriculum transformation in South Africa appears to be under-researched. Through this action research project, I have attempted to explore some of the dimensions of this topic further, as reported in Chapters 2, 4 and 5, drawing on the review of the available research, as indicated in Chapter 2. The findings of this study have confirmed a number of findings in previous research projects; and have offered some new perspectives on this topic (see Chapter 5). The findings, however, indicate that there are still a number of areas that were left 'unexplored' in this study. The focus of this chapter is therefore to highlight areas that require further research.

In this chapter, I firstly summarize the study by reviewing the different chapters in relation to the aims of the study. I will then focus on some recommendations that have emerged from the research findings. These recommendations arise out of the discussions in Chapter 5, and indicate areas that require further research.

6.2. Summary of the study

This study aimed to explore the use of learning support materials to facilitate environmental learning in C2005. As indicated in Chapter 1 (see section 1.2), I wanted to, in the context of the CSW project, understand why some educators use some of the LSM and why some educators do not use LSM. The intention was to improve the learning support materials provided to teachers, and also to

improve the support provided to teachers to use the LSM more effectively (see Chapter 1 and section 2.6.1).

This study was influenced by different contextual issues which include policy development and environmental education processes, inclusion of the environment in the curriculum, establishment of the NEEP-GET project, establishment of the CSW project, and research findings associated with different studies on the use of the LSM (see Chapter 2). All of these factors shaped and influenced this study, and the way it was designed.

The government is committed to addressing environmental issues in South Africa, as reflected in a range of new policies that have been introduced to protect the environment for the benefit of South Africa's present and future citizens. These include NEMA (RSA, 1998), Constitution of South Africa and the White Paper on Education and Training. Significant to these policies is the recognition of the role of environmental education processes in addressing environmental issues (see section 2.3). Following the White Paper on Education and Training (RSA, 1995), environmental education was recognised as an important dimension of curriculum policy making, in post-apartheid curriculum transformation. With the introduction of C2005 in 1996, `environment' was recognised as a phase organiser in the curriculum. During the Curriculum Review in 2000 / 2001, the curriculum statements were streamlined and redesigned. In the streamlined curriculum, environment is integral to all learning areas and is emphasized in the context of a curriculum principle statement, which recognizes the relationship between human rights, a healthy environment and social justice, and the need for the curriculum to be responsive to local issues. The NEEP-GET pilot project was initiated in 2000, to support the process of integrating environmental learning in the curriculum, to support educators through learning support materials, professional development and a research based approach to project implementation. This led to the establishment of the NEEP-GET project in 2001 (see section 2.4).

In line with the NEEP-GET pilot processes, the CSW project was established. As local project, developed in a community education context, it was aligned with the NEEP-GET project that included the resource-based approach to learning, active learning framework and a professional development focus. The aim of the project was to build teacher capacity in the use of LSM, contribute to teacher professional development, and research the use of LSM in classroom contexts. In the CSW project the LSM were developed using the active learning framework piloted in the NEEP-GET pilot project. During the pilot phase and phase one of the CSW project the LSM focused on waste issues, and during phase two it focused on health and water issues as a way of responding to local issues. During the pilot phase and phase one we developed the LSM for Foundation Phase, Intermediate Phase and Senior Phase and during the second phase we developed Foundation phase and Intermediate phase learning support materials. In all these phases we evaluated the use of LSM through an action research process (see section 2.6.2 and Chapter 4).

The choice of the focus for this study was influenced by the findings that emerged from different research projects, including the NEEP-GET pilot project, DoE research findings, the Learning for Sustainability pilot project and other similar research initiatives, which all indicated that there is a need to do research on why there is limited or no use of LSM (see Chapter 1 and section 2.6.1). Our understanding of `environment' (including biophysical, social, economic and political dimensions) influenced the design and development of the LSM. Open-ended active learning processes influenced both the use and design of the LSM. The LSM use and development were also influenced by the constructivist learning theories, which provide the theoretical underpinnings of learning within the OBE curriculum (see section 2.6.3).

To contextualise the research I provided an in-depth review of research findings on the use of LSM. These provided insight into the research questions. These

findings pointed to key issues associated with the use of LSM, for example the role of the educator; issues associated with language and literacy and also indicated that there was a need to explore why LSM were not used (see section 2.7).

In trying to answer the research questions I used a participatory action research approach informed by critical theory (see Chapter 3). The ontological and epistemological assumptions of critical theory were used as orientating framework of this research. Its assumptions of knowledge and reality as socially constructed provided an opportunity to understand that knowledge on the use of LSM in the context of CSW case study might be very specific to this context and should therefore not be generalized. As practitioner working within a critical theoretical framework, I sought to understand the human experience (the use of LSM) as means of changing the world (changing the LSM and the support processes we provided teachers, as well as the way in which LSM could support change in teaching and learning in the context of OBE). Noting that critical theory is committed to praxis (informed action), I used participatory action research because it combines both research and action in a research process. Working within critical theory framework provided opportunities for the CSW project support team and teachers to change practices while the research was in process, and as we reflected on the research findings. In each cycle of inquiry, the support team and teachers used the findings of the previous cycle to inform the next cycle of inquiry. The changes that were made on the following cycle of inquiry were informed by the previous cycle of inquiry (see chapters 3 and 4). In this way, the research process provided opportunities for intervention where we felt there was a need.

As indicated in Chapter 3, I also drew on critical theory as a theoretical framework because of its commitment to empowerment and emancipation. Employing participatory action research approach, within critical theory provided an opportunity for this research to contribute to teacher professional

development, the support team's professional development and my own professional development. This was achieved through workshops, providing classroom-based support to teachers, and using a research based approach to professional development, in which a balance of open-ended and structured processes were applied. This provided an opportunity for the support team and I to improve our support role to educators as they used the LSM. This also provided an opportunity for the educators concerned to improve their practices as mediators of learning and users of the LSM in the classroom context (*ibid*).

To document these processes and outcomes in the context of the CSW case study, we employed a range of data collection strategies including questionnaires, observations, field notes, semi-structured interviews, focus group interviews, workshops, reflective journals, videotapes, photographs and documents analysis. Some of these techniques worked better than others (for example we were unable to make maximum use of reflective journals, and video recordings, as noted in Chapter 3 and 4). During the pilot phase of the project we used observations and evaluation schedules. We used questionnaires to assist in our preparations for phase one of the project and during workshop preparations for phase two LSM development (see section 3.3). We used teacher and fieldworker reflections during cycle two and cycle three of the inquiry, which we improved as the process developed. I also used interviews, field notes, a reflective journal, video recordings, photographs, and document analysis to document the use of LSM in the CSW project throughout the research process.

This study identified indicators for effective use of the LSM and suggested further research into the use of these identified indicators in different settings (see section 5.2). It indicated that purpose influences the use of LSM. In the case of the CSW project, the purposes that influenced the use of LSM included curriculum development, OBE requirements, and the need for more insight into issues (see Chapter 4 and section 5.3). This research also provided insights into different types of LSM that supported the curriculum.

Like in other studies, this research indicated that teacher participation in the selection, development and adaptation of the LSM enhances the use of LSM (Loz-Sisitka & Raven, 2001). This study indicated that language and literacy competency could limit the use of LSM, a finding that was reflected in some of the other studies I reviewed (Vinjevold, 1999; Murray and Wilmot, 2000; Janse van Rensburg & Lotz-Sisitka, 2000).

One of the more interesting findings includes the articulation of the relationship between learning outcomes (what learners achieve); the use of LSM and the mediation role of educators. In Chapter 4 I indicated that this is a potentially significant finding, and requires further examination in the context of OBE, and the DoE policy on resource-based learning (Czerniewicz *et al,* 2000). In particular, this study highlighted the importance of teachers' mediation skills in the use of LSM, and it identified the close link between the role of teachers as designers and interpreters of LSM, and their mediation role in the use of LSM, thus emphasizing the integration of the roles of educators, as articulated in the Norms and Standards policy document (see Chapter 4 and section 5.5).

It further noted tensions around open-ended approaches to professional development and indicated that a `balance' of open-ended processes and more structured or pre-determined approaches helped us to develop materials that are suitable to the context. We noted however, that central to this ‘balance’ is the need for ongoing reflection-in-action, and reflection on action (see section 5.6.2).
The above summary indicates that insights have been gained in relation to the different aims of the study. Findings of the study, as reported in Chapter 5, have broadened previous research findings into the use of LSM in the context of C2005, and in relation to environmental learning in C2005 in particular. As noted above, however, these findings cannot be generalized, as they emerged in the context of a particular case study, the CSW project. I will, however, in the next section, present some recommendations which arise out of these findings, as a

way of providing some ‘starting points’ for those wishing to consider research into the use of environmental LSM in the context of C2005 in future.

6.3. Recommendations

6.3.1. 1ndicators of the effective use of LSM

One of the important findings of this research is the identification of indicators for the effective use of learning support materials (see section 5.2). Noting that these indicators have not been tested in depth, I would like to recommend that:

- the indicators identified in this study for the effective use of LSM should be researched further in studies focusing on the use of LSM; and
- that the indicators for the effective use of LSM (outlined in 5.2) be extended.

6.3.2. Considering purpose and the use of LSM

This research has highlighted that purpose has an influence on an educator’s decision to use or not use LSM in classrooms. Purposes influencing the use of LSM in this study included curriculum development, growth in knowledge and the requirements of OBE (see section 3.5). I would therefore recommend that:

- LSM should be aligned with OBE approaches and methods, for example, LSM should promote learner-centred teaching and group work;
- LSM should provide information relevant to the curriculum;
- LSM should help increase teachers' understanding of curriculum topics and assist them to interpret the OBE curriculum policy;
- LSM should support curriculum planning;
- LSM should be adaptable to suit different classroom learning situations; and
- LSM should provide the conceptual knowledge and content information that educators could use to deepen their insights into environmental issues.

6.3.3. Development of different types of the LSM to support the curriculum

This study indicated that one of the reasons why educators used LSM in the CSW project is that educators wanted to gain more knowledge on environmental issues. Specific LSM used for this purpose, appears to have been provided by the `fact sheets' and other information sheets (see section 5.4). I would therefore recommend the inclusion of `fact sheet' type LSM, which provides new or appropriate information on the topic / issue being studied.

The CSW project also indicated that educators used LSM for curriculum planning and implementation. In this research, the learning programme units (included in the LSM pack) provided guidance to educators to plan their lessons, learning outcomes and assessment. I therefore recommend the inclusion of LSM that assist educators to plan their lessons, learning outcomes and assessment activities.

The active learning framework (which provided guidance for the design of pedagogical processes that influenced learning – see Figure 2.4) influenced the development of the learning programme, and the way in which different LSM were designed and used. I would therefore recommend that attention be paid to providing `easy to access' pedagogical guidance, to support the interpretation of the learning programmes and the different LSM. Care should, however, be taken to avoid ‘reification’ of frameworks such as the active learning framework, and educators should continue to explore open-ended active learning processes and guidelines.

This research also indicated that OBE principles and requirements influenced the use of LSM. This study indicated that the worksheets used promoted learner centred approaches (see section 3.4) and group work. I therefore recommend the inclusion of interactive, learner-centred worksheets, questionnaires (e.g. audit questionnaire), and other interactive LSM that are specifically designed to

support activity based environmental learning, and which support peer interaction and learner-centred investigations.

6.3.4. Consideration of the significance of mediation processes in the use of LSM

This study highlighted the importance of educators' mediation role in enabling the effective use of LSM. A further role of importance identified in this study is the role of `teachers as interpreters and designers' of LSM. This indicates the relationship between the new roles in the Norms and Standards for Educators Policy. (see section 5.5). Based on these findings I recommend that:

- Professional development programmes aiming to encourage the use of LSM should develop educators' competencies in interpreting and designing of LSM;
- LSM should provide space for teachers to reflect on changing circumstances and conditions and adapt the LSM accordingly. This encourages educators to become reflective of their roles as mediators of learning; and

- The relationship between the different roles of educators, as articulated in the Norms and Standards for Educators Policy, should be researched further. For example, this study, involving a participatory action research design could have considered the role of the educator as ‘researcher and life long learner’ in relation to the other two roles identified above.

6.3.5. Design of LSM and learning

One of the important findings of this research is that the design of learning support materials influences the way LSM are used, and thus the learning processes. Recommendations on the design of LSM and learning are reflected in the following sub-topics.

6.3.5.1. Consider how pedagogical frameworks influence learning processes and learning outcomes

This study indicated that the active learning framework influenced learning processes and learning outcomes (see section 5.6). I will therefore recommend that:

- LSM be designed to encourage active learning processes;
- Educators should be orientated to the active learning processes, as an open-ended process; and be allowed to explore additional active learning processes as well. A range of different LSM can facilitate teachers' engagement with active learning processes;
- Further research can be conducted into how specific types of LSM (e.g. interactive worksheets; audit sheets; information sheets) enhance environmental learning; and
- The relationship between learning outcomes and the use of different types of LSM can be explored further.

6.3.5.2. Language and literacy

A further finding in this research is related to the fact that learners were not able to use learning support materials because of language problems and the literacy level of learners and educators (literacy).

6.3.5.2.1. Language

This study indicated that where the LSM were used, learners could not speak English, the language used in the LSM. In most schools learners' primary language is isiXhosa and in one school their primary language is Afrikaans. In the NEEP-GET pilot study researchers indicated that language could also be the

reason educators use `easy' material. Drawing from these findings, I would therefore recommend that:

- Language used in the LSM should accommodate learners who cannot speak the language used in the LSM (often second language speakers);
- Educators in multilingual contexts require support in dealing with language issues that may involve different cultural groups and different academic preparedness. Educators might need to understand more than one language. The complex nature of multi-lingual educator-learner relationships needs to be considered in more depth, in the design of LSM, and in further research into the use of LSM;
- Educators could be encouraged to use a learners' first language to explain, describe and discuss key concepts in conversational style to encourage the use of LSM;
- Materials developers should also consider developing LSM in a language spoken by the learners in schools, if feasible, particularly those LSM that learners are meant to use (e.g. worksheets, audit sheets etc); and
- If it is not feasible to have LSM developed in languages used in schools, English should be used and the educator's mediation role should be emphasized.

6.3.5.2.2. Literacy

As indicated in section 5.6.2.2, this study indicated that some learners were not able to use the LSM because they cannot read and write. The LFS project indicated that educators themselves often have poorly developed literacy skills and have little experience in finding information on a range of LSM. The DoE research also indicated that a poor level of literacy amongst educators causes misunderstanding of the texts and an inability to interpret signs. Drawing from these findings I will therefore recommend that:

- Teacher professional development programmes aimed at encouraging educators to use LSM should develop their competencies to access information from the LSM. This could be done by engaging educators in a process of selecting the LSM for learning programmes. The skills needed by teachers to adequately use LSM could also be researched in more depth;
- Foundation phase LSM, especially in cases where learners cannot read and write, as found in this research, should take into consideration that learners at Foundation phase level are still learning to read and write;
- LSM should incorporate pictures, as learners could relate to pictures easily even though they cannot read;
- LSM should be clearly written in accessible language, and should be clearly copied or reproduced to facilitate its use; and
- Educators should be engaged in the LSM development where they are able to contribute to the selection, adaptation and compiling of LSM for learning programme development.

6.3.6. Support Processes, Reflexivity and Research

This study indicated the importance of reflexivity in ensuring that, as a support team, we were able to improve our roles to support educators' use of the LSM and improve the research processes in CSW project. Drawing from the findings of the Learning for Sustainability project which indicated that educators and professional development practitioners in the previous educational dispensation, were never required to consider professional development for curriculum development at a local level, nor did they have to reflexively consider their own competencies and orientations in supporting educators in their work (Lotz-Sisitka & Olivier, 2000:96), we noted the importance of reflexivity. In this project we had to reflexively consider our role as a support team and reflexively review the research process. This involved clarification of a theoretical framework. The reflexive sessions enabled the support team to have regular meetings with, and provide feedback to research participants. The reflexive processes enabled the

support team to review the research methods and processes, and based on discussions with the support team we were able to redesign the research techniques used in cycle one and cycle two and to improve the support we provided (which included the LSM). Based on these findings I would therefore recommend that:

- Professional development programmes should encourage a research-based approach to inform their project's ongoing development (reflexivity);
- Action research should be encouraged to support the process; and
- Reflexivity should be encouraged to allow the teacher educators or role players in teacher professional development to improve their roles.

6.4. Conclusion

This chapter summarizes the key issues and processes associated with this research case study, and provides recommendations that could support environmental learning and the use of LSM in OBE. The Creative Solutions to Waste Project is a local environmental education project, involving a total of nine (in all) Grahamstown schools, the local municipality; community members and the Rhodes University Environmental Education Unit, where I worked at the time this study was undertaken. In this research I explored the use of environmental education learning support materials (LSM) in Outcomes Based Education (OBE). I have employed a participatory action research approach informed by critical theory in this case study of the Creative Solutions to Waste project. The research focused on `Waste Education' materials and their use, development and piloting during the pilot phase. Six schools also used the Waste Education materials, but for evaluation purpose we focused on five schools during the pilot phase and phase one of the CSW project. In phase two, the research focused on the use of `Health and Water' learning support materials in four out of six Grahamstown schools involved in this phase of the project. Research participants included educators, support team members, municipal officials, Department of Education officials, Department of Health (Eastern Cape) officials,

the Health Promoting Schools committee and NGO representatives. It employed a range of data collection strategies. The research process was collaboratively discussed and agreed upon by all the participants.

The significance of the participatory research design is evident in the tangible outcomes of the project, in the form of learning support materials that respond to local issues (see Appendix B); and in the form of a number of research findings that can inform further research into the use of LSM.

As evidence of the catalytic validity of the study, the CSW project was taken further by partners in this research (members of the support team) in the context of the Makana Schools Project, funded by WWF for 2002 and 2003 (RUEEU, 2002). The Makana Schools Project, based on the research undertaken in the CSW project, has formed one of the Eastern Cape NEEP-GET clusters, and is therefore one of a network of environmental education teacher clusters currently operating in South Africa. More than 100 copies of the materials developed in the CSW project have been produced and distributed for further use in supporting environmental learning in OBE. This year the five schools participating in the Makana cluster held an open day in November, and once again shared their environmental learning with each other and with the community who helped establish the CSW project. The meeting was attended by local councillors in the Makana municipality; Department of Education officials, teachers, parents, learners from other schools and other community members. Further environmental learning support materials are being developed; and teacher reflections have improved, and have been captured in the form of 'teacher portfolios' (Timmermans, pers. Comm., 2002).

To highlight the potential significance of this research, I draw on Czerniewicz *et al* (2000:15) (in conclusion) who note that:

> *… the main goal of resource-based learning [in which learners use a range of LSM] is to provide the opportunity for all students to develop independent learning skills, in conjunction with the acquisition of a basic*

body of knowledge, which will enable them to become lifelong learners … the essential foundation for lifelong learning is laid in the general education and training (GET) band.

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APPENDIX A:

RESEARCH INSTRUMENTS

APPENDIX A1:

CREATIVE SOLUTIONS TO WASTE

School Activity Programme

Observation and Evaluation Schedule

Name:…… Phase……

Teacher(s) Name (s)……

Activity Number……Date……

Rhodes University Support and Evaluation Team……..

Focus Area	***Description***
What was the evidence of teacher preparation? Explain.	
Explain how learners were involved in the activity	
What educational methods were used during the lesson? Were they appropriate?	

What questions were asked by the teacher during the lesson that indicates the depth and scope of the activity? How did learners respond to these questions?	
What questions were asked by learners during the lesson that indicates the depth and scope of the activity? How did the teacher respond to these questions	
Describe the teacher/ learner relationships?	
Were the materials appropriate for the learners? Explain.	
How did teacher use resources? Describe.	

Was language used appropriate for the learners?	
Time required for Activities (comments)	
Logistics (resources, transport, etc.)	
What evidence of learners' basic understanding/ prior knowledge did you note?	
What evidence did you note, that learners were developing understanding?	
What support was needed by the teacher? (examples)	

APPENDIX A2:

Questionnaire for comments on the pilot evaluation report

CREATIVE SOLUTIONS TO WASTE PROJECT

Project 2000 Evaluation

Comments:

CREATIVE SOLUTIONS TO WASTE PROJECT

Project 2000 Evaluation

Comments:

APPENDIX A3:

Focus Group Interviews

Waste Project: Focus group interviews: 15/02/2001

1. What do you expect the support team to help you with?
2. Do you think the support team fulfilled your expectations? Substantiate.
3. Can you tell how did you use resource pack that was provided to you?
4. Did you have any problems in using the resources pack provided to you? Explain the nature of a problem and tell us you solved it.
5. Which resources did you find most usable? Why?
6. How did resources help you in your teaching?
7. Did you have any problems in implementing project activities? If yes, where were they?
8. What kind of support do you think you need to effectively implement the project activities?
9. Time seems to have been a problem, what suggestions do you have for improvement?
10. What did you benefit by participation in this project?
11. How do you expect to benefit in future?
12. Comments on the depth and scope of the activities, do you think they were appropriate for your learners taking into consideration the Grade?
13. Using your observation do you think learners understood what you were teaching? Can you note at least one incidence that shows that learners' understanding was improving?

Waste Project: Focus group interviews: 15/02/2001

1. What do you expect the support team to help you with?
2. Do you think the support team fulfilled your expectations? Substantiate.
3. Can you tell how did you use resource pack that was provided to you?
4. Did you have any problems in using the resources pack provided to you? Explain the nature of a problem and tell us you solved it.
5. Which resources did you find most usable? Why?
6. How did resources help you in your teaching?
7. Did you have any problems in implementing project activities? If yes, where were they?
8. What kind of support do you think you need to effectively implement the project activities?
9. Time seems to have been a problem, what suggestions do you have for improvement?
10. What did you benefit by participation in this project?
11. How do you expect to benefit in future?
12. Comments on the depth and scope of the activities, do you think they were appropriate for your learners taking into consideration the Grade?
13. Using your observation, were learners understanding what you were teaching? Can you note at least one incidence that shows that learners' understanding was improving?

APPENDIX A3:

14. Any suggestion for improvements of resource pack.
15. Any other comments you might have.

14. Any suggestion for improvements of resource pack.
15. Any other comments you might have.

APPENDIX A4:

Creative Solution to Waste Project: Curriculum Development meeting preparation questionnaire

1. Did you use the learning support materials (LSM) in the resource pack provided by Rhodes support team?

   _____

   If yes, how did you use the learning support materials?

   _____

   _____

   _____

   If no to question 1, why did you not use them?

   _____

   _____

   _____

   _____

   If yes to question 1, which learning support materials did you find most usable? Why?

   _____

   _____

   _____

   _____

2. Did you have any problems in using the resource pack provided? Explain the nature of the problem and tell us how you solved it if you did.

   _____

   _____

   _____

3. How did the resource pack help you in your teaching?

   _____

   _____

   _____

   _____

4. Any suggestion for improvements of learning support materials and their use.

_____

_____

_____

_____

_____

5. Did you find learning programmes useful? Explain why/why not?

   _____

   _____

6. Did you find the waste project useful in supporting implementing OBE in your classroom? Please explain why/why not?

   _____

   _____

   _____

7. Time seems to have been a problem, what suggestions do you have for improvement?

   _____

   _____

8. Using your observations do you think learners understood what you were teaching? Can you note at least one incidence that shows that learners' understanding was improving?

   _____

   _____

   _____

NB: This questionnaire will help us in discussion and the development of the Waste Project learning support materials for this year (2001). We will appreciate it if you can fill it in before the materials development, but if you do not, just think through them so that you can provide your insight for the coming curriculum development workshop and you can submit it later.

APPENDIX A5:

Use of Learning Support Materials (LSM)

School…… Phase……

Do you use LSMs in your teaching? What kind do you use?	
What are the main purposes for which you use them?	
What are the main ways in which you use them?	
Do you use them mostly yourself, or do the learners use them?	
How do you guide or encourage the learners to use them	

APPENDIX A6:

Learning Support Materials (LSMs)

Reflection Questionnaire on Use and Value of Waste Programme Materials

School…… Phase……

Were the LSMs generally useful in Waste Programme? Why? Or Why not?	
Which were least useful? What were the problems with them?	
Which were most useful? How were they used?	
Were the LSMs used mostly by yourself or by the learners?	
How did you guide and encourage the learners to use the LSMs?	

APPENDIX A7:

CREATIVE SOLUTION TO WASTE PROJECT

B1: Teacher and School Profile

1. Name of the teacher: School:

_____ _____

2. Which grade(s) do you teach?

_____

3. Which Grades are participating in the project?

_____

4. Which subject(s)/learning area(s) are you responsible for?

_____

_____

_____

5. How many learners do you have in each of your classes?

_____

_____

_____

6. What is the average number of learners in your class?

_____

_____

7. Which language is mostly spoken by your learners?

_____

_____

8. What language do you primarily use for teaching in your class?

_____

_____

_____

Adapted from NEEP teacher profile questionnaire

9. How many years have you been teaching?

10. Outline you formal qualifications.

11. Which of the following main methods and approaches did you use in your teaching.

Question and answer		Group work		Project work	
Show and tell		Solitaire		Other (specify)	

12. Have you previously been involved in any in-service training before? if yes, describe it.

13. Briefly describe what you understand about OBE.

14. How would you describe the concept 'environment'?

15. Have you been involved in environmental education before? If yes, Describe.

Adapted from NEEP teacher profile questionnaire

16. Briefly describe the environmental issues you can identify in your school.

Adapted from NEEP teacher profile questionnaire

APPENDIX A8:

CREATIVE SOLUTION TO WASTE PROJECT

C1: Fieldworker Reflection

Name of teacher		Grade
Name of School		
Researcher		
Date		

1. Identify the learning support materials that were used during the lesson.

_____

_____

_____

_____

2. Describe the way a teacher uses the learning support materials during this lesson.

_____

_____

_____

_____

_____

_____

_____

3. Outline the sequence of teaching and learning activities including their content.

_____

_____

_____

_____

_____

_____

_____

4. Did you note any resources that you think the teacher could have used but did not?

_____

_____

_____

_____

5. Do you know why the teacher did not use those resources? Give details.

_____

_____

_____

_____

_____

6. Do you think the learning support materials were appropriate for the learners? Explain your answer.

_____

_____

_____

7. Were there any observable difficulties confronted by the learners in using the LSM? If so what were they?

_____

_____

_____

_____

Did the teacher address these difficulties? If so, how?

_____

_____

_____

8. What teaching methods or approaches are frequently used in the class? Were they appropriate in your own view? Explain.

_____

_____

_____

_____

10. What kind of support did you provide to the teacher during the lesson? Describe.

_____

_____

_____

11. What kind of support do you think the teacher needed during the lesson? Explain.

_____

_____

_____

12. *Was there evidence of learners developing understanding of the topic? Describe.*

_____

_____

_____

13. *Did the teacher encourage learners to build on their prior knowledge? Give examples.*

_____

_____

_____

1.4. Was there evidence of assessment in this lesson? If so, what and how?

_____

_____

_____

1.5. Describe the teacher-learners relationship.

_____

_____

_____

16. *Explain how learners were involved in the lesson?*

_____

_____

_____

17. *In you view, do you think the teacher was prepared for the lesson? Explain your answer.*

_____

_____

_____

18. *Could you comment on time planned for the activity and time taken in doing the activity?*

_____

_____

_____

19. *What is your comment on the questions asked by the teacher and responses given by the learners? Give examples.*

_____

_____

_____

20. *What is you comment on the questions asked the learners and answers given by the teacher? Give examples*

_____

_____

_____

_____

APPENDIX A9:

CREATIVE SOLUTION TO WASTE PROJECT

D1: Teacher Reflection

Name of teacher		Grade
Name of School		
Activity Name		
Date		

1. Identify the learning support materials (LSM) that you used during the lesson.

_____

_____

_____

_____

2. *Did you use any learning support materials to supplement the resource pack provided by the CSW Support Team? Name them.*

_____

_____

_____

3. Describe the way you used the learning support materials during this lesson.

_____

_____

_____

_____

_____

_____

_____

4. Outline the sequence of teaching and learning activities including the content.

_____

_____

_____

_____

_____

_____

_____

5. Were there any LSM in resource pack that you could have used but did not use? Why did you not use them?

_____

_____

_____

_____

6. Do you think the LSM were appropriate for learners? Explain your answer.

_____

_____

_____

_____

7. Did you observe any difficulties experienced by the learners in using the LSM? If so, what were they?

_____

_____

_____

_____

Did you address these difficulties? If so, how?

_____

_____

_____

8. What teaching methods or approaches are frequently used by in your class? If you were to repeat the lesson, would you make any changes? Give details.

_____

_____

_____

_____

9. What kind of support did you expect from the support team during the lesson? Describe.

_____

_____

_____

10. What kind of support did the support team provide you during the lesson? Describe.

_____

_____

_____

11. *Did learners develop an understanding of the topic? Note evidence to support your conclusion.*

_____

_____

_____

12. *Did you build on learners prior knowledge? Give examples.*

_____

_____

_____

13. *Did you assess learners? If so, what was assessed and how was it assessed?*

_____

_____

_____

14. *Describe your relationship with your learners during the lesson.*

_____

_____

_____

15. *Explain how learners were involved in the lesson?*

_____

_____

_____

16. *What preparations did you make before this lesson?*

_____

_____

_____

17. *Comment on time planned for the activity and time taken in doing the activity?*

_____

_____

_____

18. *What is your comment on the questions you asked learners and their responses? Give examples?*

_____

_____

_____

19. *What is your comment on the questions asked the learners and the answers you gave them? Give example.*

APPENDIX A10:

Reflective Journal

Personal Contact:		
Date:	Duration	
Place		
Event		

Think about use learning materials, teacher support needs, personal feelings about activities, anything that you think is important.

APPENDIX A11:

SAMPLE FIELD NOTES

20/04/2001

Issues Arising from Teachers

1. Shortage of resources e.g. papers
2. Syllabus links
3. Teachers' roles / involvement of ST

Questions for discussion

1. The use of LSM? Any problems
2. Were activities challenging enough? [illegible]
3. Suggestions for improvement
4. How can project link with curriculum

Report Back

1. Used by teachers (not learners)
2. Yes, all learners involved in act.
3. NEED Posters / Flash Cards

Intermediate need more time

6–7 weeks – involve other teachers

NEEP [illegible] (original)

25 June 2001

1. Use of material

a. Materials was quite right for foundation

b. Intermediate "

c. Use all materials

d. Foundation used by the teacher → Intermediate

e. Recycling sheets, teacher suggest, it be simplified for learners.

2. Challenging, all childs involved in activities (Foundation)

Int. – Kids involved

Suggestions for improvement

7. Posters on anything concerning Waste products

Flash Cards

More time, 7 weeks as phase organiser

Environment as phase organiser

The whole school to take part (GD) to suggest.

APPENDIX A11:

Creative Solutions to Waste Project

School Name: ARCHIE MBOLEKWA ***Grade:*** 5-7

We are preparing for materials development process for Phase 2 of the project. We would like you to help us decide on the themes for Phase 2 and 3 of the project.

Select ***only three themes*** (that you think should be used as themes for Phase 2 of the CSW project) in order of priority by putting either **A, B, or C**.
(**A**= First priority, **B**= Second priority & **C**= Third priority)

Themes	**Put A or B or C**
Water	
Soil	
Greening	B
Air	
Health	
Ecological footprint	A
Life Cycle Analysis	C
Other (Specify)	