

**EXAMINING EMERGENT ACTIVE LEARNING
PROCESSES AS TRANSFORMATIVE PRAXIS:
THE CASE OF THE SCHOOLS AND SUSTAINABILITY
PROFESSIONAL DEVELOPMENT PROGRAMME**



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ABSTRACT

This is a study on the nature of learning, particularly the emergence of active learning processes in the case of an environmental education teacher professional development programme – the Eastern Cape Border-Kei cohort of the 2008 Schools and Sustainability Course. This was a part-time, one-year course supporting teachers to qualify, strengthen and deepen opportunities for environmental learning in the South African curriculum. An active learning framework (O'Donoghue, 2001) promoting teaching and learning with information, enquiry, action and reporting/reflection dimensions was integrated into the Schools and Sustainability course design to support these environmental learning opportunities. In this study, the notion of active learning is elaborated as a situated, action-oriented, deliberative and co-engaged approach to teaching and learning, and related to Bhaskar's (1993) notion of transformative praxis.

The study used a nested case study design, considering the case of six Foundation Phase teachers in six primary schools within the Border-Kei Schools and Sustainability cohort. Interviews, observations (of workshops and lesson plan implementation in classrooms) and document review of teacher portfolios (detailing course activities, lesson plans, learners' work and learning and teaching support materials) were used to generate the bulk of the data.

A critical realist theory underpinning the methodology enables a view of agency as emergent from social structures and mechanisms as elaborated in Archer's (1998b) model of morphogenesis and Bhaskar's (1993) model of four-planar being. The critical realist methodology also enables a view of emergent active learning processes as open-ended, responsive to particular potential, but dependent on contingencies (such as learning and teaching support materials, tools and methodologies).

The analysis of emergent active learning processes focuses particularly on Bhaskar's (1993) ontological-axiological chain (MELD schema) as a tool for analysing change. The MELD schema highlights 1M ontological questions of what **is** (with emphasis on structures and generative mechanisms) and what **could be** (real, but non-actualised possibilities). It enables reflection on what mediating and interactive agential processes either reproduce what **is** or have the potential to transform what **is** to what **could be** (2E). Thirdly, the MELD schema enables reflection on what **should be** – this is the 3L “axiological moment” (Bhaskar, 1993: 9) where questions of values and ethics in relation to the holistic whole are raised. Finally, the schema raises questions (4D) of what **can be**, with ontologically grounded, context-sensitive and expressively veracious considerations.

The study describes the agency of course tutors, teachers and learners involved in the Schools and Sustainability course, as emergent from a social-ecological context of poverty and inequality, and from an education system with a dual transformative and progressive intent (Taylor, 1999). It uses a spiral approach to cluster-based teacher professional development

(Janse van Rensburg & Mhoney, 2000) focusing on the development of autonomous (Bernstein, 1990) and reflexive teachers. With teachers well-disposed and qualified to fill a variety of roles in the classroom, these generative structures and mechanisms had the power to drive active learning processes with potential for manifestation as transformative praxis. Through the analysis of the active learning processes emergent from this context, the study shows that the manifestation of transformative praxis was contingent on relational situated learning, value-based reflexive deliberations, and an action-orientation with an emphasis on an iterative relationship between learning and doing.

These findings enable a reframing of an interest in action in response to environmental issue and risk, to an interest in the processes that led up to that action. This provides a nuanced vision of active learning that does not judge an educational process by its outcome. Instead, it can be judged by the depth of the insights into absences (2E), the ability to guide moral deliberations on totality (3L), and by the degree of reality congruence (1M) in the lead up to the development of transformative agency (4D).

The study also has a methodological interest. It contributes to educational and social science research in that it applies dialectical critical realist philosophy to a concrete context of active learning enquiry in environmental education. It reports on the value of the onto-axiological chain in describing a diachronic, emergent and open-ended process; in providing ontological grounding for analysis (1M); in understanding relationality in situated learning processes (2E); in focusing on value-based reflexive learning (3L) and in understanding transformative learning as “tensed socio-spatialising process” (Bhaskar, 1993: 160) where society is emergent from a stratified ontology, and agency and change are open-ended and flexible processes not wholly determined by the social structures from which they emerge (4D).

Considering the knowledge interests defined in the 2011 South African Minimum Requirements for Teacher Education (South Africa. Department of Higher Education and Training, 2011) and the Curriculum Assessment Policy Statements (CAPS) which were implemented in South Africa from 2012 (in a phased approach), the study concludes with recommendations for exploring environmental learning in the CAPS. The study proposes working with a knowledge-focused curriculum focusing on the exploration and deepening of foundational environmental concepts, developing relational situated learning processes for meaningful local application of knowledge, supporting transformative praxis through the “unity of theory and practice in practice” (Bhaskar, 1993: 9), and implementing a spiral approach to cluster-based teacher professional development.

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LIST OF ACRONYMS

CAPS	Curriculum and Assessment Policy Statements
NEEP-GET	National Environmental Education Programme - General Education and Training
RNCS	Revised National Curriculum Statements
TMSA	Transformational Model of Social Activity
WESSA	Wildlife and Environment Society of South Africa
WWF-SA	Worldwide Fund for Nature – South Africa

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CHAPTER 1: BACKGROUND AND CONTEXT

1.1 INTRODUCTION TO THE STUDY

This study had two research interests. The first was pedagogical and entailed the examination of the emergence of active learning processes as transformative praxis. These active learning processes in question emerged from the engagement of teachers in an environmental education teacher professional development course focusing on supporting environmental learning and action in schools. A secondary research interest was methodological, with the intention of contributing to the field of environmental education research. It entailed the examination of the value of Bhaskar's (1993) onto-axiological chain (MELD Schema) as a tool for analysing emergent active learning processes.

Active learning is a widely used concept across continents and disciplines but is not explicitly elaborated in formal South African curriculum documentation. In official South African policy discourse, the first post-apartheid reference to active learning in education can be found in the 1995 *White Paper on Education and Training* which called for “environmental education¹ involving an interdisciplinary and active approach to learning” (South Africa. Department of Education, 1995: 11). The same notion has been carried through into the recently released South African Curriculum and Assessment Policy Statements (CAPS), which call for “encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths” (South Africa. Department of Basic Education, 2011b: 3). However, neither of these documents elaborate on what active learning means and what teaching and learning processes might support it.

The notion of active learning is important in an environmental education context because of an interest in social-ecological change and counter-hegemonic learning (Section 3.3). This explains why environmental educators in South Africa have taken an interest in ‘active learning’ since early interactions with curriculum change processes in South Africa, for example, with the introduction of *Curriculum 2005*, the implementation of which began in South Africa in 1998 (Dada et al., 2009) (Section 1.3).

A key influence in the developing understanding of active learning in South Africa was an active learning framework developed by Rob O'Donoghue (2001) which played a significant role in

¹‘Environmental education’ is the commonly used term in South Africa which can be related to ‘Education for Sustainable Development’ or ‘Education for Sustainability’. While acknowledging the debates regarding the assumptions inherent in the naming of these practices for the facilitation of environmental learning, the term environmental education has been used in this thesis because of the South African context of the study.

supporting teachers with the design of environmentally focused learning units and began to add meaning to the notion of active learning, which up until this point was under-theorised in educational and environmental educational fields. The framework (Section 3.2) structures information-based, enquiry, action and reporting/reflection activities around a central environmental focus (problem, risk or concern). The use of this framework in teacher professional development programmes dates back to the National Environmental Education Programme piloted in South Africa in 2000. Modifications of the same framework were pivotal in the design of the Schools and Sustainability Course which is the case forming the focus of this study.

The Schools and Sustainability Course was a Rhodes University accredited teacher professional development course designed and implemented by the Rhodes University Environmental Education and Sustainability Unit. The course ran over one year with three regional workshops and one or two tutorial workshops in between respective regional workshops. These latter workshops were supported by tutors. The course supported teachers to realise opportunities for environmental learning in the curriculum and to support sustainable lifestyle choices through this curriculum work. The following course outcomes supported this intention:

1. *Plan, implement and evaluate curriculum-appropriate lesson plans with an environmental focus.*
2. *Adapt, use, develop and reflect on the use of learning support materials*
3. *Demonstrate an understanding of and reflect on active learning processes in outcomes-based education*
4. *Select, apply and reflect on relevant assessment processes.*(Schudel, Hoffmann, Wigley, & Conde, 2008a: 5)

The course consisted of the following three learning units which were introduced at the three regional workshops respectively:

- Learning Unit 1: Environmental Learning in the Curriculum and Information in Local Context;*
- Learning Unit 2: Environmental Enquiry in Lesson Planning: Towards Environmental Improvement*
- Learning Unit 3: Assessment for Learning and Planning Environmental Improvement.*(Schudel, Hoffmann, Wigley, & Conde, 2008a: 6)

These learning units are illustrated in Figure 6.1 and elaborated on in Section 6.2.

The prototype Schools and Sustainability Course was initially developed in 2002 to support the implementation of Curriculum 2005² with yearly changes as the course was adapted through reflexive

² This was the name of the first post-apartheid curriculum in South Africa. This curriculum has since been revised twice. The first revision was in 2002 with the development of the Revised National Curriculum Statements and the second revision in 2012 with the development of the Curriculum Assessment Policy Statements.

engagement with challenges of Curriculum 2005 and the roll-out of the Revised National Curriculum Statement (Section 6.3 elaborates on the influences of this prototype course and others on the Schools and Sustainability Course). The course was also designed to offer curriculum support to different programmes/organisations committed to environmental learning. These were the National Environmental Education Programme-General Education and Training (NEEP-GET)³, Department of Water Affairs and Forestry, the Ethekwini Municipality and South Africa's Wildlife and Environment Society of South Africa (WESSA). Overall the course was run for eight separate cohorts of teachers across South Africa's nine provinces (Section 6.3.1). Consistent throughout all versions of the course was a focus on the active learning framework to guide environmental learning processes in lesson plan and learning programme development. The active learning focus of the course was influenced by Rhodes University Environmental Education and Sustainability Unit's commitment to the NEEP-GET pilot project which proposed this framework in its work with the new national curriculum between 2000 and 2001 (Lotz-Sisitka & Raven, 2001; NEEP-GET, 2005a; Schudel et al., 2000).

This study focuses on examining emerging active learning processes in the 2008 Schools and Sustainability Course. The 2008 course was a partnership between the Rhodes University Environmental Education and Sustainability Unit (responsible for Rhodes accreditation, materials development and lead tutoring), WESSA (responsible for materials development, fundraising, co-ordination and support tutoring), the Eastern Cape Department of Education, and the Eastern Cape Department of Agriculture (responsible for support tutoring).

The course entailed three two-day regional Border Kei workshops which were presented between February and October 2008. In between the three regional workshops (in each of King Williams Town, East London and Butterworth districts) a minimum of three district workshops were run by the course tutors. This research is a nested case study focusing on six Foundation Phase⁴ teachers from the King Williams Town and East London districts, both of which are located in the Eastern Cape, a province of South Africa. Rhodes University is located in this province.

I, as the representative of the Rhodes University Environmental Education and Sustainability Unit, ran the regional workshops. The district workshops were run by one tutor in each district. In between regional workshops, teachers worked on lesson plans during district workshops with the support of district tutors and on their own; with the final goal of developing and implementing three

³This was an international donor-funded programme established by a former Minister of Education – Kader Asmal. It was piloted in 2000 and implemented nationally between 2002 and 2006.

⁴ The Foundation Phase refers to the first three years of the South African schooling system, beginning from the year a child turns six years old.

environmentally-focused lesson plans linked to at least one environmental project in the school (for example, a school garden or a waste management system) (Section 6.2).

Case record data were generated during the 2008 Schools and Sustainability Course. Some of this data contributed towards an evaluation of the course commissioned by WESSA (Schudel, 2010). This study makes extended use of this 2008 case record (together with more data generated in 2009 and 2010 after the completion of the 2008 course) in order to understand, analyse and describe emergent active learning processes using a dialectical depth ontology informed by critical realism.

1.2 MOTIVATION FOR THE STUDY

Environmental education research to date focusing specifically on active learning has given insight into context, methods and learning and teaching materials internal to active learning processes as well as processes that support an environment conducive to such learning. For example, action research into the role of food gardens as a context for active learning enabled a changed perception of gardens as extra-curricular work, to gardens as a useful context for active learning enquiries and as a resource for linking everyday knowledge to abstract concepts introduced in the classroom (Ncula, 2007).

Auditing is one of the methods internal to active learning which has received attention in the research community. For example, Hoffmann discussed the effect of auditing processes which individualized choices and actions and thus became disembedded from global and social contexts (Hoffmann, 2005). She also noted the importance of processes of involvement and detachment in order to “justify ... impressions or to interrogate and refine them through measuring, describing of evidence, testing and analysis of data” (ibid.: 146). Another important finding was identifying the importance of multiple perspectives, “inter-subjective negotiation” and new knowledge beyond prior knowledge in order to better represent the complexity of issues being explored (ibid.: 148). The use of learning and teaching materials has been another lens from which active learning has been explored with an emerging emphasis on the challenge of selecting and adapting learning and teaching support materials to suit learning area and local environmental contexts (Lotz-Sisitka & Raven, 2001; van der Merwe, 2010). One of the processes supporting an environment conducive for active learning is the use of environmental policy processes to investigate local context, and to guide and plan for actions to improve environmental learning in school and classroom. Mvula-Jamela investigated this process in the case of her school and reported that the school environmental policy process helped teachers to “define contextual relevance” for applying active learning in curriculum work (2004: 112).

This particular study draws on all of these aspects of active learning, considering questions of environment as extra-curricular or integrated, everyday and abstract knowledge, prior and new knowledge, use and adaptation of learning and teaching support materials, and considerations of

relevance and transformation in education. To deepen understanding of active learning in this study, I draw on Bhaskar's ontological-axiological chain/MELD schema (Section 2.6) to consider these aspects of active learning (and others that emerge from the descriptive analysis phase) in relation to a number of core features of active learning (situated learning, action-oriented practice, deliberation and co-engagement) as elaborated in Sections 3.3 and 3.4.

A significant motivation in this study was an intention to deepen my understanding of the notion of change. The study explores an implicit interest in transformation in the Schools and Sustainability Course such as evident in one of its learning outcomes that teachers should support learners to "develop a response to environmental issues" (Table 6.3 – Section 6.3.2). Further evidence of an implicit interest in transformation is an interest in "tangible change" in an evaluation of a previous iteration of the course (Section 6.3.3.3). Bhaskar's (1993) notion of transformative praxis was employed in this study to assist me in developing a more nuanced sense of change beyond simply change as tangible or empirically evident. This helped to avoid conflation of the intended and implicit transformation interests in the course and the observations of the actualization of transformative praxis.

My personal interest in the study was shaped by my work as a lecturer in education, where I have used the active learning framework for environmental education teacher professional development in different courses and contexts. The framework is useful because it offers a flexible approach for designing environmental learning opportunities, but in the different contexts in which I have seen it applied, I have noticed challenges with the high level of complex understanding, investigative skills, and critical and applied thinking required in responding to environment and sustainability challenges raised through working with the framework. Such 'high level skills', however, are important for quality education and have been a consistent principle in different versions of the curriculum released in South Africa since 1994, providing further policy related motivation for exploring the possibilities of a pedagogical framework that supports the development of such skills.

In course materials for universities active learning is referred to in the following way:

Open and active processes of learning can also be described as learning by doing, discovery learning, hands-on experiential learning. What these strategies have in common is that the learner becomes socially, culturally, and cognitively involved in a reflexive learning process. The learner is encouraged to investigate the world, find out about it with others, and engage in collaborative reflections and change-oriented actions.(United Nations Environment Programme, 2006: 28)

Despite this, and further references to active learning in South African environmental learning discourse, it remains under-theorised particularly in relation to 'transformative praxis' and how this emerges in and through active learning in schools. In this study, transformative praxis is seen as a

process of social change as described by Bhaskar (1993; introduced in Section 1.7). At an international level this study can make a contribution to the field of environmental education through exploring the espoused or assumed potential of active learning to manifest as transformative praxis; developing an understanding of active learning as situated, deliberative and co-engaged, and action-oriented; and considering how the transformative potential of active learning processes is actualised in complex and changing social-ecological and educational contexts. The intention is to support environmental educators who are exploring how to engage teachers in ways that are beneficial to society and that represent meaningful, quality learning.

With a significant shift in South African curriculum policy in 2012 (Section 1.3), this research can make timeous input at a national level (a second key contribution) for environmental educators who are once more exploring the potential for meaningful and quality curriculum processes. This research links in with concurrent research by a consortium of institutions that, in 2011, formed a national Teacher Development Network which has audited the new curriculum for environmental learning opportunities in specific subjects, and is developing exemplars to be implemented in an environmental education teacher professional development course endorsed by the national Department of Education (Lotz-Sisitka, 2011). The consortium includes the Rhodes University Environmental Learning Research Centre⁵ (the institution at which I work), WESSA, Delta Environmental Centre, the Department of Environmental Affairs, the South African National Botanical Institute and South African National Parks. The intention is for this research to inform the activities of this consortium. The changing curriculum context in South Africa and the implications for environmental educators is elaborated in the following section.

1.3 ENVIRONMENTAL LEARNING IN A CHANGING CURRICULUM CONTEXT

This and the following two sections introduce the national and provincial context (curriculum, educational, teacher professional development, and social-ecological context) in which the course was conducted. Figure 1.1 below presents a timeline of policy development, environmental education initiatives and curriculum development and review in South Africa. This historical context is elaborated in the following text.

⁵Note that, in 2010, the institution at which I work changed name from the Rhodes University Environmental Education and Sustainability Unit (through which I initiated the Schools and Sustainability course) to the Environmental Learning Research Centre.

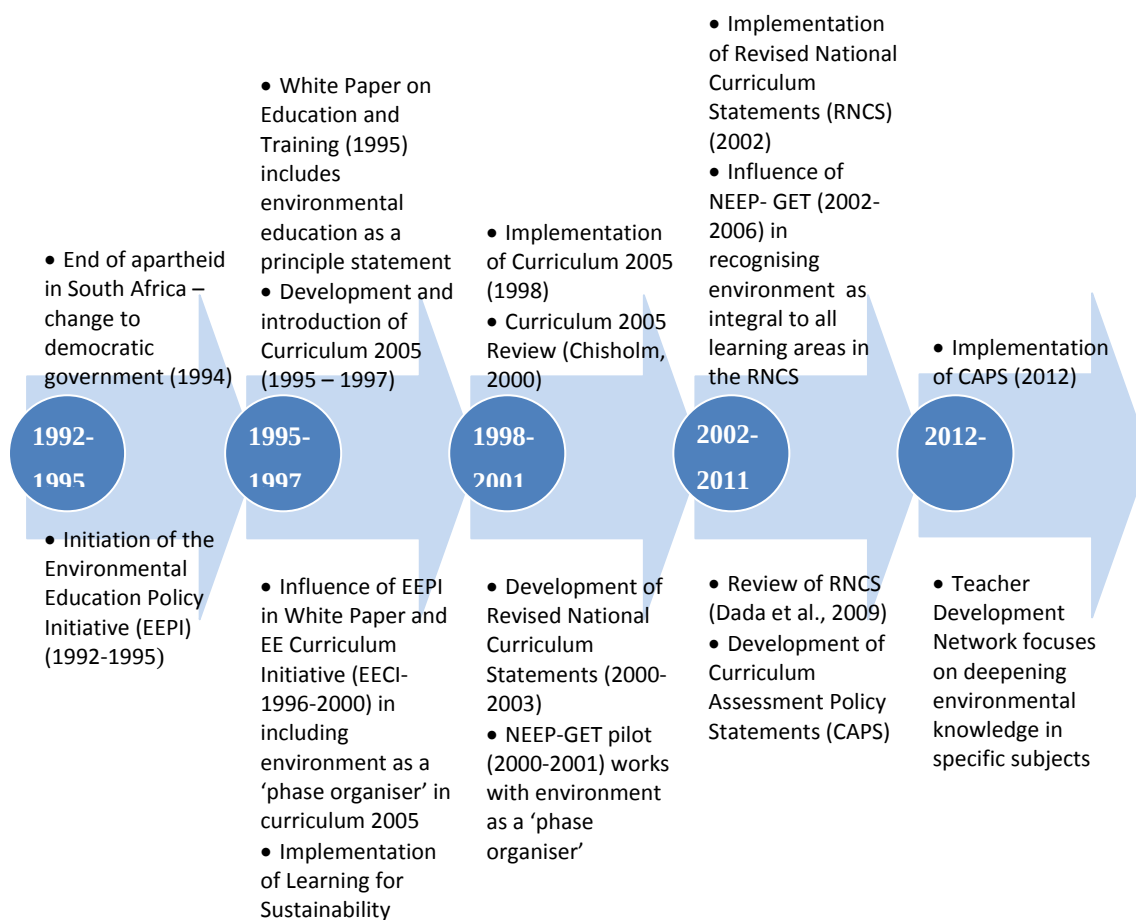


Figure 1.1 Timeline of policy development, curriculum development and review, and environmental education initiatives in South Africa

The South African school curriculum has undergone a number of changes since the introduction of democratic rule in 1994. A brief historical review below illustrates the national curriculum context in which the Schools and Sustainability Course was presented.

Early post-apartheid curriculum shifts reflecting concern for both “needs and means” (Sayed, 2011) had both transformative intent - in response to past injustices and inequalities, and pedagogical intent – with “outcomes-based education and training [forming a] link between the intentions and results of learning, rather than the traditional approach of listing of content to be covered within a learning programme” (South Africa. Department of Education, 1997a: no page number). The transformative intent was underpinned by the 1995 South African *White Paper on Education and Training* which called for major changes in education and training in South Africa in order to “normalise and transform teaching and learning in South Africa”, and work towards a “prosperous, truly united, democratic and internationally competitive country with literate, creative and critical citizens leading productive, self-fulfilled lives in a country free of violence, discrimination and prejudice” (South Africa. Department of Education, 2002j: 4). The pedagogical change was also influenced by the same

White Paper which called for a “shift from the traditional aims-and-objectives approach to outcomes-based education” (ibid.: 4). Thus, the White Paper, together with the National Education Policy Act (No. 27 of 1996) (providing for the development of design tools to support outcomes-based education) initiated the phasing in (from 1998) of the new curriculum: Curriculum 2005.

A significant addition (for environmental educators) in the White Paper was a principle statement calling for an interdisciplinary approach to environmental education to be “integrated across all phases and levels of the education and training system” (Lotz-Sisitka & Raven, 2001: 67). The inclusion of this principle statement in the White Paper was due to lobbying work of the national Environmental Education Policy Initiative (EEPI) – a state-civil society participatory policy making initiative which operated between 1992 and 1995 (Lotz-Sisitka, 2002; NEEP-GET, 2005a; Reddy, 2011).

At this time one of the key curriculum challenges for the environmental education community was developing a cross-curricular approach with ‘environment’ as one of the legislated ‘phase organisers’. Phase organisers were a curriculum design tool to deal with significant cross-cutting issues in society and this particular one was influenced by the work of the multi-stakeholder Environmental Education Curriculum Initiative (EECI) – an extension of the Environmental Education Policy Initiative (ibid.). The EECI operated from 1996 – 2000 (Lotz-Sisitka, 2002). The first teacher professional development programme to work at a provincial level with Curriculum 2005 was the Learning for Sustainability Project which operated in Mpumalanga and Gauteng from 1997 – 2000. The Learning for Sustainability Project focused its work with Curriculum 2005 on testing ways in which environmental education with a “cross-curricular approach in outcomes based education could be realized” (NEEP-GET, 2005b: 6).

This cross-curricular approach suited the re-organisation of the South African curriculum into ‘learning areas’ instead of ‘subjects’⁶. A learning area was defined as “a field of knowledge, skills and values which has unique features as well as connections with other fields of knowledge and learning areas” (South Africa. Department of Education, 2002j: 9). This meant a curriculum structure with more fluid boundaries and opportunities for integration across different ‘fields of knowledge’. Integration became a key feature of lesson planning and teachers were expected to integrate across learning outcomes⁷ and across learning areas. The curriculum specified the importance of “the

⁶ Note that with the third curriculum revision in South Africa (the CAPS), knowledge was once more organised into subjects.

⁷ A ‘learning outcome’ in the South African context referred to skills which learners were expected to master and demonstrate in order to proceed to the next curriculum level. The depth and scope of each learning outcome was detailed for each grade through a number of ‘assessment standards’. These terms were used in changing curriculum policy documents between 1998 and 2011, but ‘learning areas’ have recently been reverted to

achievement of an optimal relationship between integration across learning areas and conceptual progression from grade to grade” (ibid.: 13); however a problem with the cross-curricular approach to environmental learning (as promoted by environment as phase organiser) was that, in practice, a focus on a cross-cutting theme tended to detract from furthering the “aims of the learning area” and “deepening of knowledge or process skills from specific learning areas” (Lotz-Sisitka & Raven, 2001: 67).

In 2000 a ministerial committee review of Curriculum 2005 (Chisholm, 2000) recommended a streamlining of the design features of the curriculum. A result of the streamlining was that the revised curriculum, the Revised National Curriculum Statement, released in 2002 (in response to the 2000 review and after a period of public comment and revision), no longer had environment as a phase organiser. At this time of transition, the NEEP-GET pilot research project was implemented (August to December 2000). The NEEP-GET research took place during the roll-out of the 1998 curriculum while at the same time acknowledging concerns raised by the 2000 review. The NEEP-GET project provided orientation and insight into “ways in which environment [could] be considered in different learning areas” (Lotz-Sisitka & Raven, 2001: 6).

Despite the removal of phase organisers (which promoted theme-driven learning), there was a persistence of theme-driven learning which “compromised conceptual learning and progression within subjects” (Dada et al., 2009: 24). Another problem affecting conceptual learning and progression stemmed from naïve interpretations of constructivism within outcomes-based education (Moll, 2002). Outcomes-based education was still a driving principle in the Revised National Curriculum Statement (RNCS) which kept “intact the principles, purposes and thrust of Curriculum 2005 and [affirmed] the commitment to outcomes-based education” (South Africa. Department of Education, 2002j: 6). Constructivism (and associated over-emphasis on group work as a learning and teaching method) was often naïvely interpreted as a theory that learners⁸ construct knowledge through their own experiences and interactions without introduction to new ideas and concepts (Section 4.5.3). In the 2009 review of the curriculum, researchers commented that “content is found in different forms in different documents and at different levels of specificity” (Dada et al., 2009: 47). This was despite the intention of the RNCS for greater “emphasis on discipline-based subjects” in order to provide a knowledge-base which learners could engage with as they constructed their own understandings (ibid.: 24); and with its “vision of teachers and

‘subjects’ and ‘learning outcomes’ and ‘assessment standards’ have been replaced by content in a knowledge-focused curriculum (see later in this section).

⁸ In keeping with a vision of a person as an active constructor of knowledge with increased responsibility for his/her own learning, the South African curriculum documents use the term ‘learner’ instead of ‘pupil’ to refer to the child in the classroom (as well as to refer to those involved in education at all other levels).

learners who are knowledgeable and multi-faceted, sensitive to environmental issues and able to respond to and act upon the many challenges that will still confront South Africa in this twenty first century” (ibid.: 1). A significant change in the RNCS in the Foundation Phase was streamlining the learning areas into three learning programmes⁹. The Life Skills Learning Programme had Life Orientation as its main learning area, the Numeracy Learning Programme had Mathematics as its main learning area, and the Literacy Learning Programme had Home Language as its main learning area. Teachers were expected to integrate learning outcomes from other learning areas (Natural Sciences, Social Sciences, Technology, Economic and Management Sciences, and Arts and Culture) into their lesson plans within these Learning Programmes¹⁰.

Environmental education work at this time was based on the environmental focus integral to each learning area (which was explicit in learning area statements, learning outcomes, assessment standards and core knowledge foci of each learning area – Section 4.5.2). Also, underpinning the environmental education work was one of the curriculum principles which highlighted the importance of developing an “awareness of the relationship between human rights, a healthy environment, social justice and inclusivity” (South Africa. Department of Education, 2002j: 10). This **relationship** highlighted the importance of environmental learning and also formed an important conceptual foundation for the transformative intent still present in the revised curriculum. This focus was taken further in the post-pilot NEEP-GET programme which continued to work closely with curriculum requirements (NEEP-GET, 2005a: 8).

Another issue significant to environmental educators at this time was that of textbooks. Teachers had been cast in the role of “designer of learning programmes and materials” (South Africa. Department of Education, 2000: 13). The notion of teacher as designer suits the need for ‘responsiveness to context’ which has guided teacher professional development in environmental education programmes (see Sections 3.3.1 and 3.4). Environmental education teacher education programmes consequently tended to focus on the selection, adaptation and use of learning and teaching support materials¹¹ (or a ‘resource-based approach’ to environmental learning) (Lotz-Sisitka & Raven, 2001: 48; Raven, Timmermans, Lotz-Sisitka, & Nduna, 2005: 28; Schudel et al., 2000: 3; Schudel, 2006: 1). Difficulties with this were reported in these same projects and included a concern for the “complexity”, “language” and “level” of the materials (Raven et al., 2005: 52-53) while raising a question for further research about whether the selection of less complex materials was compromising

⁹ A learning programme was structured by the requirements of a main learning area integrated with other relevant learning areas.

¹⁰ The complexity of this task can be seen in the lesson plans presented in Chapter 7 – for example Table 7.1.

¹¹ In South Africa educational resources are referred to as ‘teaching and learning support materials’ which highlights the view that they can be used by a teacher to facilitate educational processes or directly by a learner to proactively facilitate his/her own learning.

depth and scope of learning as required by the curriculum (ibid.: 53). Cases where teachers continued to rely on the textbook as their main source of information raised unanswered questions in the research about how relevant these were to environmental learning (ibid.: 55). The fact that “teachers appeared to have had little opportunity to engage with knowledge around specific issues and so attempted to engage learners in exploring these issues without having developed their own understandings and perspectives” (Raven et al., 2005: 27) raised questions about teachers’ own foundational knowledge and how they find, adapt and use materials that are relevant and meaningful to contemporary environmental issues and risks (Lotz-Sisitka, 2011; Mbanjwa, 2002; Nduna, 2003).

The new CAPS to be implemented in South Africa in 2012 include a strong emphasis on content knowledge as an important foundation for learning. This was clearly influenced by the 2009 national review which highlighted that “a key dimension related to the successful implementation of curriculum relates to the detail and clarity provided by policy in relation to what to teach” (Dada et al., 2009: 47). The renewed focus on content knowledge and specified assessment within a further streamlined curriculum was shared by the South African Minister of Education when introducing the new CAPS documents to the public: “The intention is to streamline the curriculum documents into single documents for each Grade and each Subject in which content and assessment are specified” (Motshekga, 2010: 6).

Pilot environmental education teacher professional development interventions by a consortium of South African environmental education organisations, have provided insight into future environmental learning in the CAPS. A CAPS analysis by this consortium identified a “wide range of environment and sustainability content and concepts in a wide range of subjects” (Lotz-Sisitka, 2011: 28). A national case study report prepared by this consortium highlighted the need to identify and work with key environmental and sustainability concepts and knowledge in the specified content of the different subjects (within the new CAPS documents knowledge areas are now named ‘subjects’ instead of ‘learning areas’) and give attention to assessment and quality concerns such as literacy and numeracy (ibid.).

Further to this and to summarise the discussion above, other consistently pertinent issues raised by environmental education engagement in the previous curriculum iterations, need to be considered in relation to active learning. These are concerns for transformation, scope and depth of learning, and working with knowledge foundational to environmental learning. These concerns are raised again and discussed in more detail in Section 4.5 of the thesis.

1.4 THE EDUCATIONAL CONTEXT

The duration of this study – from data gathering to the writing phase – took place during the implementation of the 2008-2011 Foundations for Learning Campaign initiated by the former South Africa Minister of Education, Ms Naledi Pandor, in response to the concerns regarding numeracy and literacy levels in South African schools. These concerns were raised by South Africa's performance in the following tests internationally:

- In 1999 South Africa participated in the Monitoring Learning Achievement Project along with eleven other countries. South Africa scored “the lowest average in numeracy, the fifth lowest in literacy and the third lowest in Life Skills” (South Africa. Department of Education, 2008: 31).
- Between 2000 and 2002, the Southern and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) tested Grade 6 learners in 14 countries. South Africa achieved just under the mean SACMEQ score in both reading and Mathematics, ranking eighth in reading and ninth in Mathematics (ibid.: 31).
- South Africa's mean score on the Trends in Mathematics and Science Study (TIMSS) placed “South African Grade 8 learners at the very bottom of 50 participating countries” (Taylor, Fleisch, & Shindler, 2007: 2).
- A 2006 participation in the Progress in International Reading Study (PIRLS), involved over 30 000 South African learners in Grades 4 and 5. In this test the raw mean scores for the Grade 4 learners was found to be “13.2% and the Grade 5 learners to be 18.2%” (ibid.: 14).

And the following tests nationally:

- “72% of all Grade 6 learners failed a national literacy test in 2004. In mathematics, the figure [was] substantially higher, with 88% of all Grade 6 learners failing to achieve the curriculum standard” (ibid.: 2).
- Grade three teachers scored an average of 55% in a Grade 6 level literacy test conducted by the Department of Education in 2007 (South African Human Rights Commission, 2010: 183).
- The 2011 South African Annual National Assessment in literacy and numeracy for grades 3 and 6 revealed that “the percentage of learners reaching at least a ‘partially achieved’ level of performance varies from 30% to 47%, depending on the grade and subject considered. The percentage of learners reaching the ‘achieved’ level of performance varies from 12% to 31%” (South Africa. Department of Basic Education, 2011f: 6).

These poor results internationally and nationally are despite a 2006 “98% net enrolment rate in primary education” (South Africa. Department of Basic Education, 2011b: 20). Other factors that one would expect to contribute positively to the education system is that “at 5.4% of GDP, South African

spending on education is high by comparable standard” (ibid.: 2), although “below the ... UNESCO benchmark of 6%” (South African Human Rights Commission, 2010: 171). Also, data presented by Shindler and Fleisch (2007 in Taylor et al., 2007: 11) show that “there is no difference in the rate in which males and females of official school going age participate in schooling”.

Basic statistics reporting substantial spending, and high total and gender-balanced enrolment placed against poor academic results raise more complex questions, such as:

1. How are government funds being distributed and spent? This is considering that “provinces are not obliged to observe national priorities, particularly regarding the allocation of financial resources” (South African Human Rights Commission, 2010: 168)?
2. How much is school enrolment an indication of school attendance? This is considering issues of accessibility such as costs of school fees and uniforms, distance some learners must walk to get to school, inadequate nutrition which affects ability to function in an academic environment, safety and security at school, and social exclusion (especially orphans, children affected by HIV/AIDS and non-national children) (ibid.; see also Nelson Mandela Foundation, 2005). Also “an estimated 38 percent of South African learners engage in some form of household/domestic labour such as cooking or cleaning, with African girls most likely to have these responsibilities” (Community Agency for Social Enquiry & Joint Education Trust, 2007: 27).
3. What is the quality of education once children are in school? This is considering a decreasing percentage of provincial education departments’ budgets spent on teacher salaries (“from 83% of the total provincial education budget in 2004/05 to 76% in 2009/10” (South African Human Rights Commission, 2010: 172)); the literacy and numeracy issues of teachers and learners reported above; and low pass rates in the senior certificate national examinations, for example, “in 2008, 38% of those who wrote the matriculation examination failed, and most of those who did pass, passed with very low grades making it difficult for them to access higher education and skills training” (ibid.: 182). Another concern is that of input from teachers. The South African Human Rights Commission hearings in 2006 (towards their 2007 report) revealed that while there were:

many teachers who are passionate, committed and hardworking, there is evidence of many teachers who have low morale, spend too little time in the classroom, are unqualified, are not sufficiently trained in the new curriculum, use outdated teaching methods in classes that are too big and who are disconnected from the communities in which they teach. (Community Agency for Social Enquiry & Joint Education Trust, 2007: 31-32)

4. Are “girls and boys ... able to benefit equally from schooling opportunities”? (South African Human Rights Commission, 2010: 168)? This is considering “During its 2006 public hearings

the South African Human Rights Commission found evidence of male teachers coercing sex from girls (even exchanging food for sex), and of male teachers and learners that subject girls across South Africa to sexual abuse and harassment at school on a daily basis” (Community Agency for Social Enquiry & Joint Education Trust, 2007: 33; see also Nelson Mandela Foundation, 2005).

5. What is the level of access to resources? For example, “provinces spend nearly R1.5 billion per year on learning and teaching support materials. However, considerable inefficiencies have been reported in the procurement of learning and teaching support materials leading to a reported shortage of books in the classroom” (ibid.: 175). Harley and Wedekind reported that “52 per cent of schools are inadequately supplied with textbooks and ... 83 per cent of schools do not have libraries” (2004: 200). A 2011 study by Hendricks in Eastern Cape schools indicated that such situations are still evident in the Eastern Cape, with an example given of a school which reported a case of less than one textbook per three children, children sitting with no desks, the teacher teaching with no desk or chair, and books lying “on the dusty cement floor of an impoverished library housed in a block of [unusable] toilets” (Hendricks, 2011: 257-258).
6. What are the infrastructural challenges? Considering that “many schools do not have electricity, decent toilets and adequate teaching resources. Overcrowding is also commonplace and 80% of schools do not have libraries or science laboratories” (South African Human Rights Commission, 2010: 181)
7. What are the curriculum challenges? Reflecting on the outcomes-based system even after the changes in the RNCS, the South African Human Rights Commission observed that: “disparities in resources and educator preparedness make this modern, high knowledge, resource intense curriculum an inappropriate model in the South African context” (ibid.: 183). The Commission added that “the problem is also exacerbated by the fact that most learners are not being taught in their home language, which makes it more difficult to engage with the curriculum” (ibid.: 183). The marginalisation of African languages can be attributed to a sense amongst the parents of black children that “their children could lack socio-economic access and mobility if they are taught in their home languages” (Mda, 2004: 184).
8. What is the throughput rate of learners? Considering a: “98% attendance rate amongst 14 year olds in 2007, which dropped to 95% of 15 year olds, 88% of 17 year olds and 59% of 19 year olds attending an educational institution” (ibid.: 183).

Inequality in terms of academic achievement amongst schools with different historical backgrounds is another stark reality in South African schools that relates to the issue of accessibility. Historically, the South African National Party 1953 Education Act instituted a racially-stratified education system with separate teacher education institutions for designated racial categories: ‘white, coloured, indian and

black’(Wits Education Policy Unit, 2005). The inequality in education entrenched through this system is still evident today as argued by Taylor et al. (2007: 2) who reported that: “South Africa’s levels of inequality are revealed by cross-country testing programmes to be the highest by a large margin among participating countries”. This level of inequality is mirrored by a consideration of two indices developed by the United Nations Development Programme as indicators of development and inequality within countries. According to the United Nations Development Programme *Human Development Report* for 2010, South Africa has a “medium” Human Development Index of 0.597 – ranking 110 out of 169 countries with the highest Human Development Index (0.938 for Norway) ranked as number 1(United Nations Development Programme, 2010: 154). A Human Development Index is a composite measure of “information on life expectancy, schooling and income” (Klugman, 2010: 3). Adjusted for inequality, South Africa’s Human Development Index dropped to 0.411. The *Human Development Report* explained that “the lower the Inequality-adjusted Human Development Index (and the greater the difference between it and the Human Development Index), the greater the inequality” (Klugman, 2010: 10). The drop of 31.2% in Human Development Index with adjustment for inequality highlights the magnitude of inequality in South Africa from a development point of view.

In a country where there are clearly substantial education challenges, the Eastern Cape, where this study was conducted, is in even more serious crisis relative to its provincial counterparts. The systemic issues contributing to the serious state of educational delivery in the Eastern Cape was highlighted by the national government’s decision, in June 2011, to intervene in the running of the province with a plan for:

- 1) *Developing and implementing systems and operations relating to planning and accountability, budgeting and financial management, supply chain management and human resource capacity to ensure effectiveness and sustainability;*
- 2) *Ensuring effective human resource provisioning across the system;*
- 3) *Ensuring effective delivery of school infrastructure programme to deal with the high number of mud and unsafe school structures; and*
- 4) *Improving and providing delivery of quality education for our learners.*(South Africa. Department of Basic Education, 2011e: no page number)

The specific problems in the Eastern Cape are elaborated below.

In 2007 South African Senior Certificate results indicated that “the lowest proportion of learners with a university entrance pass are [in the] Eastern Cape at 9%” (South African Human Rights Commission, 2010: 182). The Eastern Cape achieved the lowest results (next to Limpopo Province) in the 2004 national literacy and numeracy tests conducted with Grade 6s (Sayed, 2011: 5-6). In 2011the Eastern Cape Province results (as percentages) of the Annual National Assessment can be seen in Table 1.1 below.

Table 1.1 Results as percentages of the 2011 South African Annual National Assessments (South Africa. Department of Basic Education, 2011f: 20)

Grade 3		Grade 6	
Literacy	Numeracy	Literacy	Numeracy
39%	35%	29%	29%

These results are well below the targeted minimum of 60% for 2014 set by the Department of Basic Education even if accounting for a possible inflation of Eastern Cape results as suggested by the report. Because of this possible inflation, it may be misleading to make comparisons across provinces with this data, so that has been excluded from this discussion.

There are a number of factors where the Eastern Cape difficulties are significantly acute and which may account for the poor results reported here. “In the Eastern Cape, teachers reported that 74% of learners were affected by problems relating to an unstable home environment (including poverty¹², physical and mental disabilities and social and emotional needs” (Community Agency for Social Enquiry & Joint Education Trust, 2007: 26). Another feature of the Eastern Cape is that it is a largely rural population, hence the significance of the findings that “rural learners tend to be engaged in time-consuming domestic and agricultural chores and transport to schools is particularly inadequate in rural areas” (ibid.: 27, see also Nelson Mandela Foundation, 2005). Another problem particularly evident in rural areas is “one of the most common reasons for children not attending school in South Africa (and particularly in rural areas) is that their families need them to work” (ibid.: 27).

Besides the above-mentioned socio-economic factors, there are also internal educational factors that need to be considered. According to the most recent data available at the time of writing, in 2009 the Eastern Cape had a learner-educator ratio of 29.8:1 (compared to a national average of 29.6:1) (South Africa. Department of Basic Education, 2010: 16). However, the South African Human Rights Commission pointed to 2007 data to note that: “these statistics mask the variation in the size of schools and classes with some educators having classes of 50 learners or more and ... 25% of classrooms overcrowded with more than 45 learners per classroom” (South African Human Rights Commission, 2010: 183). Although the amount of money spent per learner is reported by the Human Right Commission to be equal across provinces, they highlight that this is not a good indication of

¹²With a benchmark of poverty (extrapolated from South African Bureau of Marketing research) measured as any family with an income less than “R1 489 per month per household of 4,7 people” Landman estimated that in 2000 46% of South Africans were living in poverty (Landman, 2003: 4-5). By another measure of quality – the ‘multidimensional poverty index’ – presented in the United Nations Development Programme’s 2010 Human Development Report, South Africa is presented in a more favourable light with only 3% of the population living in multi-dimensional poverty. This is taking into account aspects of education, health and standard of living which are determined by a number of indicators. Using this index, UNEP defines any individual “with at least 30 percent of the indicators reflecting acute deprivation” as living in ‘multidimensional poverty’ (Klugman, 2010: 11).

equality because “these measures do not capture the backlogs in education spending in each province ... [nor] different ratios of personnel and non-personnel expenditure, which means that access issues must be thought of differently in, for example, the Western Cape and the Eastern Cape” (South African Human Rights Commission, 2010: 174). Non-personnel expenditure includes, for example, infrastructure and funding for no-fee schools.

This concludes a discussion on the broad national and provincial schooling context in which this study was conducted. This discussion on the educational context will be revisited in greater detail in Section 4.5 with reference to specific features of active learning. Another important educational consideration is the broad context of teacher professional development in the country as discussed in the next section.

1.5 TEACHER PROFESSIONAL DEVELOPMENT

In this section, reflections on rationalisation, the new curriculum, autonomy, and new knowledge and applied competence are presented in order to illustrate some key concerns for environmental learning in the changing field of teacher professional development.

In 2008, the Schools and Sustainability Course was introduced to teachers against a backdrop of “the rationalisation of the teaching community into a single national system” (South Africa. Department of Education, 2007: 4). Difficulties with the rationalisation of the system are found, for example, in the district offices which were reconstituted by the democratic government instated in 1994. District officials have potential for supporting teachers in meeting the challenges of under-qualification and changing curriculum contexts, however difficulties with this level of teacher support were noted. The 2009 Curriculum Review reported that many teachers see the role of district officials “primarily as technician and demanding of unnecessary administrative tasks and ‘box ticking’” (Dada et al., 2009: 8). Also the limited numbers of these officials nationwide precluded qualitative in-class support for teachers. Many did not have sufficient knowledge and skills and, “in the absence of role clarification and training for the subject advisors, many ... resorted to developing tools to help interpret policies and guidelines that ... contributed to the confusion and proliferation of documents and paperwork” (ibid.: 8). For this reason, the Schools and Sustainability Course realised the potential to develop the capacity of curriculum support staff through the use of education officials as tutors on the course, based on a spiral approach to cluster-based teacher professional development. The cluster-based approach to teacher professional development was introduced to the environmental education teacher professional development field through the Learning for Sustainability Project. This approach involved regular workshops amongst teachers mediated by teacher educators and involving reflexive

processes towards deepening understandings and competency in professional practice (Janse van Rensburg & Mhoney, 2000) (Section 6.3.2.1).

One of the challenges of the new curriculum was the RNCS's requirement for a three-tiered curriculum planning process for which teachers needed a learning programme, work schedule and lesson plans (Dada et al., 2009: 25). Curriculum planning through identifying and realising environmental learning opportunities integrated in the curriculum became the main assessment task in the Schools and Sustainability Course with the intention for teachers to use evidence from these tasks in teacher portfolios which they were required to produce for the nationally implemented Integrated Quality Management System¹³ (Section 4.3.2).

The 2009 curriculum review reported heavy workloads expected of teachers due to the three layers of curriculum planning, overload of assessment tasks as well as assessment complexity, and the keeping of learner portfolios (Dada et al., 2009). The review recommended that portfolios should be reduced to a teacher's **file** which should include an "annual work schedule; assessment plan; formal assessment tasks and memoranda; textbook to be used; and a record of each learner's marks per formal assessment task" (Dada et al., 2009: 28). The review added that lesson plans should no longer be compulsory, but developed and recorded "at the teachers' discretion" and also suggested a reduction in assessment tasks (ibid.: 28). The implications of the reduced number of assessment tasks and the focus shifting from lesson planning to textbook use are discussed further in Section 4.5.

Despite an encouraging increase in the percentage of teachers with an appropriate minimum qualification (between 1998 and 2005), in 2005 14% of primary school teachers nationally were considered under-qualified (South Africa. Department of Education, 2008: 36). This presented an additional challenge for teacher professional development. For environmental education this meant needing to work with teachers at basic levels of competence at the same time as addressing the needs of the new curriculum and the complexities of environmental concerns.

Having discussed the curriculum, broad educational, and teacher professional development context of the Schools and Sustainability Course, and having made some brief references to poverty (and its associated social ills) with respect to its effect on education, the following and final contextual discussion returns to the question of poverty and inequality in the Eastern Cape. This is with the acknowledgement that questions of poverty are integral to the environmental concerns raised by teachers and learners during the course (nutrition, water access and sanitation, and water and

¹³ This was a system introduced in South Africa in 2002 in order to shift a system of inspection to a system of self-evaluation and external evaluation.

sanitation). It is these concerns that determined the environmental focus of the lesson plans developed and implemented by the six teachers participating in the research.

1.6 THE SOCIAL-ECOLOGICAL¹⁴ CONTEXT

Post-apartheid South Africa is still beset by high levels of inequality between rich and poor.

Inequality can be measured by a gini coefficient, which can range between 0 and 1. “The closer to 1, the more unequal a society, and the closer to 0 the more equal a society. The gini score for South Africa is about 0.6. ... and with Brazil, South Africa has one of the most unequal income distributions in the world” (Landman, 2003: 3). A large gini score indicates that poverty should not only be viewed as an indication of a poor or inefficient economy or lack of resources, but that a big gap between rich and poor is a significant consideration. Noting inequality is significant in this study as three particularly impoverished contexts are represented across the six schools of the case; that is, rural areas, ‘townships’¹⁵ and informal urban settlements. Also, the Eastern Cape, the province in which this study took place, is particularly impoverished because of its history of being the site of two large former homelands¹⁶, the Ciskei and the Transkei. Because of this legacy, van Niekerk argued that “for those living in better-resourced provinces, the ideal of social rights enshrined in the [South African] constitution has greater possibility of achievement, while the chances diminish for those in provinces with [homeland] legacies”(van Niekerk, 2011: 72).

The following sections underline some of the key environmental challenges in the Eastern Cape in general and then focus on issues associated with rural areas, ‘townships’ and informal settlements.

The Eastern Cape Province is:

Arguably the poorest province in South Africa, although the Northern Province and KwaZulu-Natal are held to compete strongly. Data available from Statistics South Africa show that more than two thirds of the Eastern Cape households are classed as suffering from poverty (Statistics South Africa, 2003) and 32% are unemployed. (Labour Force Survey, 2001 in Statistics South Africa, 2003). (CSIR, 2004: 131)

¹⁴ The use of social-ecological to refer to environmental issues indicates an emergence of the social (including cultural, economic and political) environment from the biophysical environment as implied in models of human-environment relationships (Hattingh, 2004; Parker, 2010).

¹⁵ In South Africa, the term ‘township’ refers to the (most often under-developed) urban living areas that, from the late 19th century until the end of apartheid, were reserved for black people. In post-apartheid South Africa the term has remained, and although the government is making inroads with respect to developing these areas, they remain under-developed relative to the traditionally white-owned areas.

¹⁶ A homeland refers to an area legislated by the South African apartheid government as an area in which black people were moved to in order to create a system of ‘separate development’. These areas were intended to become self-governing over time. One of these, the former Ciskei, became self-governing (to a limited degree) before the end of the apartheid era.

The CSIR further noted that:

The lack of employment and income in many households means that these households are extremely vulnerable to many of the problems associated with poverty such as poor health care (leading to increased mortality due to notifiable diseases) and lack of access to basic resources for good quality of life. The situation in the Eastern Cape Province is further exacerbated by the increasing incidence of HIV/AIDS ... [with] a provincial HIV prevalence amongst antenatal clinic attendees of more than 20% in 2002. (ibid.: 132)

This situation can be traced historically to the Eastern Cape being “one of the main focal areas for the apartheid social engineering effort (i.e. separate development with all its attendant social, spatial and political consequences)” (ibid.: 130). The persistence of apartheid policy in South Africa is highlighted in the Southern African Development Community (SADC) 2008 State of Environment report with the statistics that:

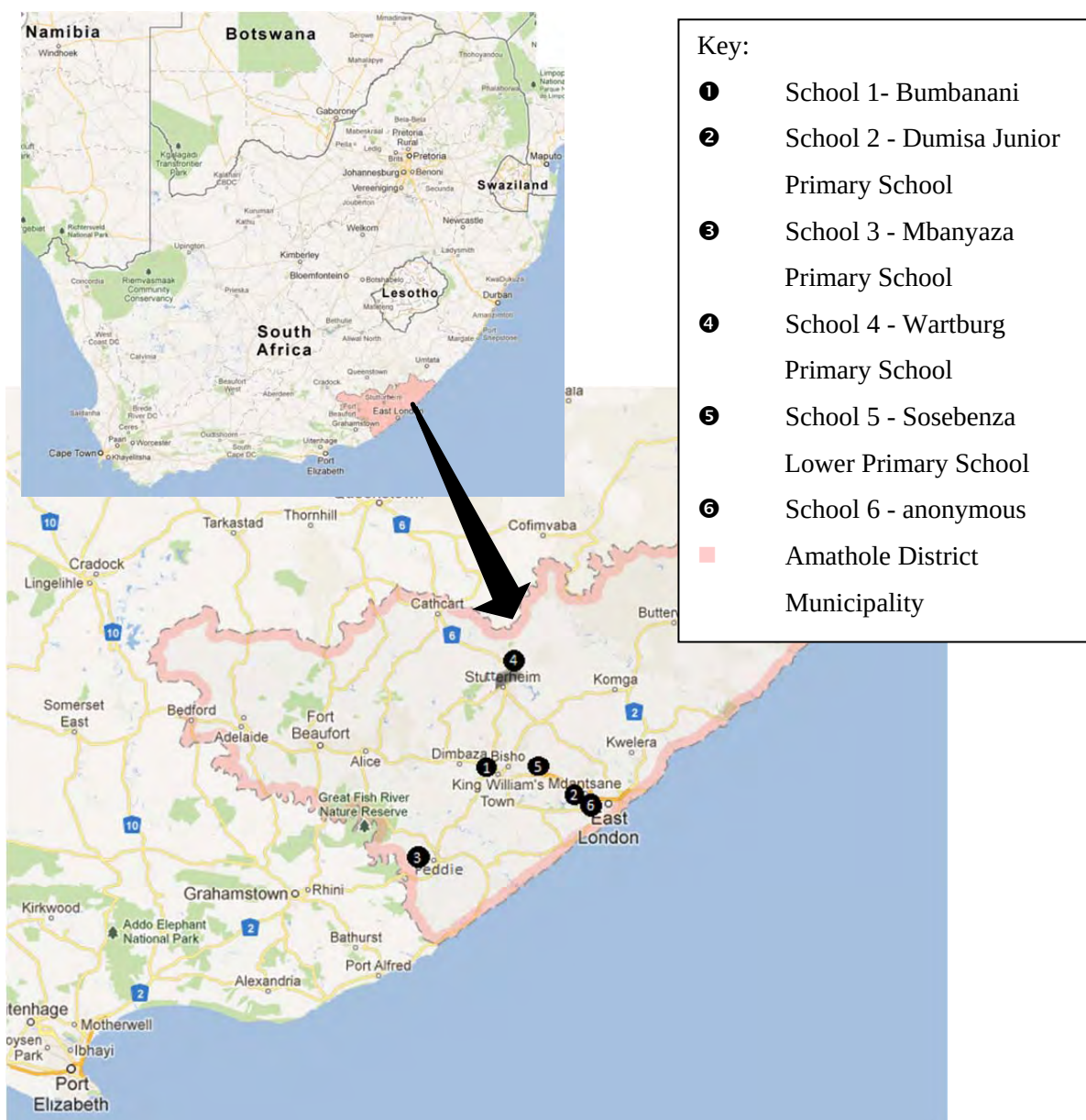
the majority of the rural population is yet to enjoy the benefits of liberation in relation to land. Prior to 1998, some 60,000 white farmers owned 87 percent of the farming land while 13 million black peasant farmers were confined to 13 percent of the land. The country's land ownership structure has not changed much since then ... so that South Africa's imbalance in land holdings is reflected in gross income disparities between the two groups, and greatly impedes growth in rural incomes for poor households, effectively stalling rural non-farm-sector growth and poverty reduction. (SADC (Southern African Development Community), SARDC (Southern African Research and Documentation Centre), IUCN (World Conservation Union), & UNEP (United Nations Environment Programme), 2008: 31)

The Eastern Cape, as a predominantly rural province, is considered to be one of the three most degraded provinces in South Africa (CSIR, 2004). The CSIR reported that the Eastern Cape had “one of the highest provincial indices of soil degradation, particularly within commercial farmland areas” with “most of the land area of the Eastern Cape Province ... classed as ‘Affected Drylands’” (ibid.: 130). In addition more than half of the Province was reported as “showing moderate or high soil loss” (ibid.: 130). The International Fund for Agricultural Development highlighted the link between land degradation and poverty with research that found that: “worsening environmental degradation contributes to lower incomes and deepening poverty, and over time, poor people can become trapped in a downward spiral, with ever-worsening poverty and resource degradation” (2002: 19). The dire situation in the Eastern Cape is highlighted by the fact that “the Minister of Water Affairs and Environment declared the Amathole District Municipality (ADM), along with all other five district municipalities in the Eastern Cape, as drought disaster areas at the end of July 2009” (Amathole District Municipality, 2010: 4). The direct problem for children in this situation is highlighted by a United Nations report on the achievement of the Millennium Development goals which emphasised the vulnerability of rural children with the statement that: “children living in rural areas of developing regions are twice as likely to be underweight as are their urban counterparts” (United Nations, 2011: 5). In the Eastern Cape there is a “high dependency on social grants and pensions” (Nelson Mandela

Foundation, 2005: 25) with the child support grant being the means by which older children in child-headed households and unemployed parents are able to access funds to support children in their care.

Two of the six schools in this study were located in rural villages which reflect the patterns of inequality, land degradation and food insecurity described above. The first was a rural village situated 21 kilometres outside of Stutterheim (Wartburg Primary School - School 4 – Figure 1.2). Some people in this village were employed in the timber industry and many others were unemployed. The second was another rural village situated 25 kilometres from Peddie (Mbanyaza Primary School - School 3 – Figure 1.2) (within the former South African ‘homeland’ of the Ciskei). Here, many people were unemployed and agricultural projects such as ostrich and chicken farming had been initiated in order to support the local economy. This illustrates how fitting it was that nutrition was the environmental focus chosen by the above-mentioned two schools.

Figure 1.2 Diagram representing the situation of the Amathole District Municipality in South Africa and the location of the six schools in the study (Adapted from AfriGIS, 2012)



The largest city in the proximity of these rural villages – East London – has a “growing modern economy linked to global production chains ... contrasted with an extremely poor rural economy in former homeland areas” (Amathole District Municipality, 2010: 11). The difficult conditions in rural areas and the promise of employment in the urban areas can help to explain the high degree of urbanisation in the province, which in turn leads to different, but equally challenging situations in crowded ‘townships’ and informal settlements. Binns, Illgner and Nel reported “the province ... experienced an average annual urban growth of over six percent between 1996 and 2000, the highest in the country” (2001: 351). Despite the fact that “South Africa’s efforts resulted in the construction of more than one million low-cost houses between 1994 and 2000” (SADC et al., 2008: 163), the problem arises when “the rate of urban population growth initially outstrips the capacity of municipal authorities to provide the necessary services and infrastructure, so that the number of slums and unplanned peri-urban settlements increases” (ibid.: 163). This means that the supply of electricity, roads, piped water, and waste management and sanitation systems becomes a challenge in fast growing areas; and “the proliferation of informal settlements ... result in disease, destitution and moral decay, which further worsens the spread of HIV and AIDS” (ibid.: 166).

The above conditions describing impoverished urban areas are illustrative of the situation of the next three schools participating in this study. Mdantsane, a legacy of apartheid separate development in South Africa outside of East London and within the Buffalo City Metropolitan Municipality, is the second largest township in South Africa. Mdantsane was the site of one of the urban schools participating in the study (Dumisa Junior Primary School - School 2 – see Figure 1.2). Adjacent to Mdantsane is an informal settlement – the site of the second urban school participating in the study (School 6 – Figure 1.2) – which, due to its proximity to places of employment in the city centre, has “dense shack settlements developing in the area” (Buffalo City Municipality, 2008: 42). The third urban school in this study was located in another township situated seven kilometres from King Williams Town (Bumbanani School - School 1 – Figure 1.2) and also within the Buffalo City Metropolitan Municipality. People here are mostly unemployed and a few work in town as domestics, gardeners and shop assistants. Considering the challenges of the impoverished urban environment, it seems fitting that these three urban schools chose issues of waste, water and sanitation as their environmental foci for the Schools and Sustainability Course.

A sixth school in the study (after the two rural and three urban schools described above) was located in a peri-urban area, situated on the periphery of the city of East London (Sosebenza Lower Primary School - School 5 – Figure 1.2) and serving children from ‘townships’, informal settlements and farmland, bordered by industrial areas. The eclecticism of the area can be represented in a positive light as is done by the Buffalo City Integrated Development Plan which sees the area as potentially a “source of fresh produce, job opportunities and industrial/commercial/tourism” (Buffalo City

Municipality, 2008: 42). At the same time an apt concern for the area is captured by the SADC State of Environment Report which noted that:

falling employment levels in the formal sector, particularly in mining, agriculture and manufacturing, have dealt a severe blow to the migrant labour system, forcing hundreds of thousands of workers and their dependents to fall back on the informal sector and subsistence agriculture for survival. (SADC et al., 2008: 31)

The above two quotes illustrate a state of ‘limbo’ in which many peri-urban societies in South Africa find themselves – on the margins of agriculture and industry without the resources and capabilities to gain a stronghold in either. The school in this area was the third school in the study to focus on nutrition in the Schools and Sustainability Course.

In Section 4.7 the social-ecological issues raised above – namely food and nutrition, waste management, and water access and sanitation – are discussed further. This section describes in more detail food insecurity in the face of social service inefficiencies and drought, waste management in the face of a fast-growing urban population, and water access – also challenged by a growing urban population and poverty in rural areas.

1.7 AN INTERDISCIPLINARY CRITICAL REALIST STUDY

This study was interdisciplinary in the first instance because environmental education is by its very nature an interdisciplinary study field which brings together environmental sciences and education.

The study’s interdisciplinarity was further informed by critical realist ontology and a dialectical analytic approach drawing largely on Roy Bhaskar’s (1993) explanation of societal change through dialectical critical realism. As such the study makes contributions to the field of education studies (professional development and curriculum) through its application of dialectical critical realism in understanding the pedagogy of active learning, particularly active learning’s transformative potential (Section 8.2). It also contributes to the philosophy of social science through providing an example of the application of dialectical critical realist philosophy to educational enquiry. This was through its exploration of the value of dialectical critical realism in understanding processes that are diachronic, emergent, open-ended, relational, value-based and reflexive, contextually specific, and temporally and spatially diverse (Section 8.3). Lastly it makes contributions to the field of the philosophy of education by drawing on dialectical critical realism in understanding the relationship between education, individuals and society; freedom and agency in education; and ethics, knowledge and truth in professional development and pedagogy (Chapter 9). This illustrates the interdisciplinary nature of the study and its philosophical underlabourings contributed by critical realism as discussed in more detail below.

Specifically Bhaskar's ontological-axiological chain or 'MELD schema' was employed to analyse active learning processes as transformative praxis, through consideration of their emergence in particular professional development and school contexts. Transformative praxis is described by Bhaskar (1993: 9) as the "unity of theory and practice in practice", and is a point of social change which emerges out of social engagement with, and intra- in inter-subjective reflection on, the pre-existing world into which actors are thrown. The MELD schema enables analysis of transformative praxis at these different points of being and becoming (see Chapter 2).

The usefulness of critical realism for the study, and its contribution to applied educational research is its quest for uncovering significant generative mechanisms even in the absence of desired social-ecological change. Critical realism offers a methodological perspective that helps to describe possibilities for change and identify the mechanisms that could generate or obstruct this change. This interest in possibility is highlighted by Sayer (2000: 12) who explained that a critical realist ontology "makes it possible to understand how we could be or become many things which currently we are not". Even in cases where potential powers of objects are exercised, tendencies may counteract or reinforce one another. Thus "tendencies are *transfactual*, that is, they say that objects are working independently of the factual outcome, separated from the factual events" (Danermark, Ekstrom, Jakobsen, & Karlsson, 2002: 57). Chapter 2 elaborates on the basic tenets of critical realism, dialectical critical realism and the MELD schema.

Critical realism was used to inform a research methodology needing to acknowledge the existence of non-empirical (transfactual) structures and mechanisms with determining potential in society; the open-ended nature of society and educational processes; the need for an emancipatory approach to research; and the need for judgemental rationality in dealing with epistemological relativism which is integral to a constructivist understanding of human knowledge and understanding. Sections 5.2 – 5.4 elaborate on the methodological implications of critical realism for social science research and for this educational study.

The emphasis on dialectical critical realism in this study (the second wave of critical realism) is explained in Section 2.6.5. This work with the second wave of critical realism draws almost entirely on the work of Bhaskar (*ibid.*) and his close collaborators Alan Norrie (Norrie, 2000) and Mervyn Hartwig (Hartwig, 2007). It also draws on authors (discussed further in Section 1.8) that have been advancing and influencing understanding of the first wave of 'original' critical realism. Important to note in this study is that it seeks to distil essential features of dialectical critical realism and *apply* these in detail in an environmental education context. This means that its scope is limited in terms of examining philosophical discontinuities amongst the visionaries and applied researchers within the

field of critical realism, as well as in terms of examining critiques of critical realist philosophies. This has been identified as important for further study.

1.8 RESEARCH QUESTIONS

This research was designed to answer:

Question 1: How do emergent active learning processes manifest as transformative praxis in the context of teacher professional development?

This question required the illumination of a range of curriculum, professional development and social-ecological factors influencing active learning processes in order to understand their ‘emergent’ nature. It also required a description of the processes using ideas from educational theory regarding their situated, deliberative and co-engaged, and action-oriented nature. This description provided a first level of analysis out of which the dialectical MELD analysis became possible (a second layer of analysis). Finally the findings from these analyses were used to reflect on the implications for environmental learning in the new national CAPS (see Section 1.3).

Thus this question was addressed through the following goals:

- **Goal 1:** Describe the key influential initiatives, orientation, interactions and deliberations of the Schools and Sustainability Course.
- **Goal 2:** Describe the context, planning and implementation of active learning processes in terms of their espoused and/or actualised situated, deliberative and co-engaged, and action-oriented nature.
- **Goal 3:** Use the ontological-axiological chain (MELD schema) to explain the relationship between emergent active learning processes and transformative praxis.
- **Goal 4:** Reflect on the implications of the transformative praxis potential of emergent active learning processes for environmental education in the context of contemporary South African curriculum changes.

The research aimed to reflect on the following methodological question:

Question 2: How can dialectical critical realism contribute to environmental education research?

This question drove an exploration of the methodological implications of critical realism, which has been described as a philosophical under-labourer for methodological decisions but which has been under-theorised in terms of its practical implications and applications in data generation and analysis. However, there is an emerging body of research in the field of environmental education (Davies, 2009; Huckle, 2004; Mukute, 2010; Pesanayi, 2007; Price, 2007; Shava, 2008) to which this research will contribute. In a broader context, this study will form part of an emerging body applying critical realism in social research in different fields, for example, in Education (Archer, 1979; Brown, 2009; Shipway, 2001), Geography (Sayer, 2009), Law (Norrie, 2000), Economics (Naess, 2006); and in

interdisciplinary studies in disability and climate change research respectively (Bhaskar & Parker, 2010; Danermark, 2002).

The following goal was identified in order to answer this question:

- **Goal 5:** Reflect on the ontological-axiological chain (MELD schema) as a tool for analysing emergent active learning processes.

1.9 STRUCTURE OF THE THESIS

Chapter 1: This chapter has introduced the study, its rationale and its educational, curriculum, teacher professional development, and social-ecological context. The critical realist underpinnings of the research and the research questions and goals were introduced.

Chapter 2: This chapter elaborates on dialectical critical realism as a tool for understanding change processes (specifically using Bhaskar's notion of the axiology of freedom), drawing on Archer's (1998b) morphogenetic cycle, and Bhaskar's (1993) model of four-planar being and ontological-axiological chain (MELD schema). This chapter outlines key tenets of critical realism for further development in informing the research methodology and the analysis of emergent active learning processes.

Chapter 3: This chapter provides an overview of O'Donoghue's (2001) active learning framework and then explores – at the national and international level – the notion of active learning as an approach to environmental education, with a subsequent elaboration on active learning as situated, deliberative and co-engaged, and action-oriented.

Chapter 4: This chapter examines the purpose of education in terms of the transformative and/or progressive role it plays in society. This is followed by a discussion on the context of curriculum, teacher professional development and socio-economic conditions in relation to active learning as elaborated in the previous chapter.

Chapter 5: This chapter further elaborates on critical realism in relation to different research approaches. The study is described as a nested case study and the implications of critical realism for case study research and educational research specifically are discussed. The study site and participants are described and so are the data generation methods, followed by a description of the two phases of data analysis in the study. The chapter concludes with a discussion of issues of validity and ethics particular to the study.

Chapter 6: This is the first data presentation chapter. The chapter describes how the Schools and Sustainability Course is structured and the materials used to support it. This is followed by a description of key influences in the development of the course. Thirdly, detail is presented of deliberations and interactions by and amongst teachers, and amongst teachers and tutors, in the development of their lesson plans and portfolios – the outcome of the course.

Chapter 7: This is the second data presentation chapter. It is the description of the six nested cases in terms of their school and community context, their teacher and classroom context, an overview of the curriculum requirements selected by teachers and activities conducted in the classroom. Each case also has a first level analysis of the active learning processes in terms of their situated, deliberative and co-engaged, and action-oriented nature.

Chapter 8: This chapter is a discussion developed from a second level analysis of the data using the ontological axiological chain (MELD schema). From this a number of analytical statements are presented in relation to the first research question. A response to the second research question, a reflection on the use of the MELD schema in the research is also structured in terms of analytic statements.

Chapter 9: This concluding chapter summarises the research process. It then discusses implications of the research for teacher professional development in terms of the new CAPS curriculum in South Africa, and the knowledge interests and (collective) roles for teachers legislated in recent South African requirements for teacher education. Finally critical reflections on the research process are shared and recommendations are made for further research.

CHAPTER 2: CRITICAL REALISM AND DIALECTICAL CRITICAL REALISM

2.1 INTRODUCTION

Bridges and Smith (2007) argued the value of philosophy for underpinning social science research by explaining its value in informing:

- Understanding of the nature of the research object/s: In this case that is through providing insight into constructivist approaches to education and the nature of knowledge, and insight into freedom, rationality and the transformational goal of curriculum.
- The research methodology in terms of: Underpinning ethical and social principles, the claims that we can make on knowledge of these objects, and the methods of enquiry that we employ.

Section 1.7 introduced the way in which a critical realist philosophy was used in this study towards these ends. This chapter provides an overview of the elements of dialectical critical realism that have been used to inform this study. This includes an explanation of the basic tenets of ‘original critical realism’ as determined by Bhaskar as well as dialectical critical realism which embraces and extends these tenets.

The contemporary notion of critical realism as a philosophical movement arose from the elision of the terms ‘transcendental realism’ and ‘critical naturalism’ (Archer, Bhaskar, Collier, Lawson, & Norrie, 1998: ix). Bhaskar and Lawson explained that the essence of transcendental realism “lies in the movement at any one level from knowledge of manifest phenomena to knowledge, produced by means of antecedent knowledge, of the structures that generate them” (1998: 5). This view of natural science argued against a positivist dependence on empirical evidence to account for scientific phenomena.

Critical naturalism was born out of Bhaskar’s search for a theory of social science that transcended the dichotomy between two opposing positions. The first being a “more or less unqualified **naturalism**” which asserted that “society, and human phenomena generally, could be studied in the same way as nature”, and “which normally took the form of positivism”. The second position was “**anti-naturalism**, based on a distinctive conception of the uniqueness of the social realm; that is, a pre-interpreted, conceptualized or linguistic in character – hermeneutics” (Archer et al., 1998: xiv, my emphasis). However, while hermeneutics held an anti-positivist view of social science, the approach shared a positivist view of natural science with the naturalist approach to social science. Thus Bhaskar proposed a “qualified, *critical* and non-reductionist, *naturalism*, based upon a transcendental realist account of science and, as such, necessarily respecting (indeed grounded in) the specificity and emergent properties of the social realm” (ibid.: xiv, emphasis original). In other words, critical

naturalism reflects a view of society that emerges from an independent reality which includes generative mechanisms beyond our empirical experience of events. This is the essence of the notion of ‘stratification’ which is explained further in Section 5.2.

Thus, taking ideas from both transcendental realism and critical naturalism, critical realism can be seen as:

- Realist in that it “holds that objects of knowledge (perception etc.) are relatively or absolutely independent of our knowledge of them” (Hartwig, 2007: 97). Understanding this requires what Bhaskar refers to as ‘referential detachment’ – a presupposition of “discourse that must be about something other than itself, of praxis which must be with something other than itself or of desire which must be for something anterior to itself” (1993: 407). That is, it insists upon a “continued independent *reality of being*” (Archer et al., 1998: x);
- Transcendental in that it transcends empirical experience (we cannot deny the existence of something just because we have not directly experienced its existence) and also transcends the actual (a power or tendency or generative mechanism still exists even if it has not manifested as an event) in that it is transfactual. Hartwig described transfactuality as a “tendency in play that is not invariably manifest at the level of events” (Hartwig, 2007: 85). Bhaskar explained that “the exercise of the causal powers of structure, that is, the working of a generative mechanism, ... must be interpreted as applying transfactually, that is to say in closed and open systems alike” (Bhaskar, 1993: 405).
- Naturalist in the insistence of the “dependence of social and ... human life upon nature, i.e. materialism” and susceptibility of these to scientific explanation (Hartwig, 2007: 322).
- Critical in that it embraces epistemological relativism (one can have “alternative accounts” of reality) but insists upon the possibility for judgemental rationality (there is a “rational criterion” for choosing between these accounts) (Archer et al., 1998: 11).

Yet, critical realism includes more than this: There is a third moment (after transcendental realism and critical naturalism) in the development of Bhaskar’s critical realism, which elaborated further on criticality and judgemental rationality by ushering in the question of ethics, thus enabling the possibility for “explanatory critique of consciousness (and being), entailing judgements of value and action” (Bhaskar, 1994: 71).

The above features of Bhaskar’s ‘original critical realism’ have been briefly presented here to ‘set the scene’ for dialectical critical realism which is required in this study to understand transformation and change in the pedagogical processes and concepts discussed in Chapters 3 and 4. These features of original critical realism are elaborated further in Section 2.6.1 because they are integral to dialectical

critical realism. In addition, I return to them in Section 5.2 with respect to their methodological implications. In the next section, the development of dialectical critical realism as an elaboration on ‘original critical realism’, is presented as building a concern for ‘becoming’ (engaging with the real world) onto an explanation of ‘being’(our ontological grounding) (see Section 2.6.2). It is ‘being’ which has causal efficacy in our process of ‘becoming’ and which holds the possibilities for change open to us. The following section demonstrates the role that dialectical critical realism can play in strengthening and deepening of critical reflection in, and understanding of, change and change processes, such as those pre-supposed in active learning theories.

2.2 DIALECTICAL CRITICAL REALISM AS A TOOL FOR UNDERSTANDING CHANGE

In his book *Dialectic: The Pulse of Freedom*, Bhaskar (1993) applied the idea of dialectic to further his earlier ‘original critical realism’ to develop an onto-axiological perspective of change. His sense of dialectic grew out of a renovation of the Hegelian dialectic, and drew on a Marxist critique of the Hegelian dialectic¹⁷. He (Bhaskar) described dialectic as “essentially involving contradiction, and as a dynamo of conceptual and social change” (Bhaskar, 1993: 175). He explained that dialectical contradictions may “induce crisis tendencies which are systemic and/or structural and/or implicate power²¹⁸ relations and/or effect legitimizing and/or motivating ideologies” which may, in turn, “stimulate or release transformative mechanisms and agencies” (ibid.: 163). Bhaskar’s notion of dialectic differs from Hegel’s in its acknowledgement of absences. He insisted that all ills (lack of freedom) can be interpreted as an absence of some sort out of which may grow an emancipatory interest in the absenting of those ills (a change interest). Thus the emancipatory (change) agenda involves transformative negation or “absenting, most notably of constraints on desires, wants, needs and interests” (Bhaskar, 1993: 175). He added that “foremost among such constraints will be those flowing from Power2 relations ... of exploitation, domination, subjugation, oppression, repression and control” (ibid.: 175-176). Thus he presented a definition of *absenting absentive agency* as “absenting absence; and, since all ills can be seen as absences and absences as constraints, as absenting constraints (and vice versa), the definition of dialectic as, or as the axiology of freedom” (ibid.: 176, emphasis in original) with absentive agency referring to Power2 relations which constrain the absenting of ills.

¹⁷ In order to contain the scope of this study and given its applied nature, it was not seen to be of great significance to probe the original works of Hegel and Marx in great depth. I have therefore relied mainly on the work of Alan Norrie (2010) and Bhaskar (1993) who have provided detailed readings of their engagement with the original works of Hegel and Marx.

¹⁸Power2 relations are described by Bhaskar as oppressive power relations. Section 2.5 elaborates on the notion and differentiates these from Power1 relations whose characteristics entail the possibility of human emancipation.

This definition of dialectic emphasises the notion of absence and the active verb of ‘absenting’. Bhaskar described the latter as “the causally efficacious *transformative* negation or spatio-temporally distanced (or rhythmically processual) or (more or less) holistically totalizing intentional change” (ibid.: 176). A new concept introduced in this definition is the idea of ‘holistically totalizing intentional change’. This specific type of change characterises Bhaskar’s dialectic. The notion of ‘holistically totalizing’ can be traced to the hermeneutic concern for ‘totality’ (discussed further in Section 2.6.3 and 5.2). In other words, change needs to be considered in terms of its contribution to the holistic whole. With respect to ‘intentional change’, Bhaskar described intention as existentially intransitive and highlights the “causal efficacy of reasons” (Shipway, 2001: 53). Bhaskar pointed out the importance of distinguishing between “real reasons for action (which may be more or less unconscious/ and to a greater or lesser extent ideologically formed) and mere ex post or pre-rehearsed rationalizations” (1993: 164). This distinction is important for the researcher who must understand that reasons explained by people are not necessarily the ‘real’ reasons for their engagement with the world, or for the researcher who needs to interpret what shapes teaching practices and pedagogy in classrooms.

The role of the ‘rational agent’ in change is further elaborated by Bhaskar’s argument that a rational agent is one who:

- “Possesses the knowledge to ‘act in one’s real interest’ (the cognitive requirement) (Bhaskar pointed out the significance of the nature of the knowledge which may be “tacit competence, knowledge ‘how’ rather than propositional knowledge ‘that’, practical not discursive” (1993: 260));
- “Is able to access skills, resources and opportunities to do so (the empowered component) (β)”;
- “Is disposed to so act (the dispositional or motivational condition) (γ)” (Bhaskar, 1993: 260).

Even with the above, it is only an ‘autonomous agent’ that will be able to fully realise the potential for change. Bhaskar explained that: “the root conception of freedom with which I am working is that of autonomy in the sense of self-determination” (ibid.: 260). Shipway elaborated, explaining that autonomy “presupposes a freedom of choice, though not a complete absence of choice” (2001: 196). In other words, it is nonsensical to propose that people have the choice to do whatever they want when there are constraints on their freedom to make or realise those choices.

Dialectic was equated above with the ‘axiology of freedom’ (or ‘emancipatory axiology’). Hartwig drew on Bhaskar (1993) to describe this as a dialectic cross-fertilisation between “the **theory** of possibility of a planetary society of unity-in-diversity in which the free flourishing of each is a

condition of the free flourishing of all” (otherwise known as a eudaimonistic society) and “totalizing depth **praxis**” (2007: 157, my emphasis).

Bhaskar elaborated on a eudaimonistic society by explaining that:

Only the empowered individual can assist or effectively solidarize with the powerless, so that amour de soi, rather than amour propre, is the true fount of all 'altruism', and that it is enlightening not egoistic for the individual to acknowledge her real self interests. Here one might envisage the following dialectic (of 7E's):

self-esteem<-> mutual esteem (where the intra-dependence of action itself reflects both the fiduciary¹⁹ nature of the social bond and the reality of oppressive social relations) <-> existential security <-> ergonic efficiency <-> (individual -> collective ->totalizing) empowerment<-> universal emancipation <-> eudaimonia.(Bhaskar, 1993: 265)

To elaborate on totalising depth praxis, it entails praxis that is:

- Transformed, transformative – “marking the coincidence of autoplasic [self-changing] and alloplastic [other-changing] change, subjective needs and objective possibilities” (Bhaskar, 1993: 266);
- trustworthy, totalising, transformist (oriented to deep structure global and dialectically universal change). This is praxis whose validity is ethically considered (requiring a “vast stretching of the moral imagination”) (Bhaskar, 1993: 265) in the context of its holistic place in society and commitment to change; and
- transitional (resulting in change in the status quo) praxis (adapted from Bhaskar, 1993: 266; and Hartwig, 2007: 159).

2.3 DIFFERENCE, ABSENCE AND CHANGE

Bhaskar argued that his model of transformative praxis is about “absenting the given (and typically driven by and against absence)” (Bhaskar, 1993: 152). Thus ‘real’ difference (absence as product) drives an agent in the act of absenting (absence as process). Norrie explained that difference “stems from the simple fact of – irreducible real difference – in the world” (2010: 163). Hartwig (2007: 37) elaborated on absence as product as “structures and things considered under the aspect of their differentiation in space”. Norrie explained the significance of difference by noting that “it is only the existence of real difference that permits me to detach myself from other persons and things.

Intransitivity, the ontological separation of the referrer from the referent, is transcendently necessary for discourse, and it relies on difference” (2010: 163).

¹⁹ Hartwig (2007) explains fiduciary as a synonym for ‘trust’.

The notion of absence is also important in understanding ills and how the emancipatory agenda is elaborated in dialectical critical realism. An ill is either an absence or transposed as an absence. For example lack of nutrition would be an absence, whereas a transposed absence would be “the ill of endemic poverty [imposing a] constraint upon absencing the absence of wealth” (Shipway, 2001: 96). In the case of a school experiencing an absence of good nutrition, self-sustenance and/or income; the presence of endemic poverty might impose a financial, resource-based or knowledge-based constraint on starting a garden, selling produce or using this to supplement school feeding schemes.

Bhaskar (1993: 164) argued that “it is informed (or misinformed) desire, propelled by absence that powers transformative praxis or negation”. For him, “real determinate negation, absence or non-being, is not equivalent to Hegel's nothing, which entirely lacks determinacy, and any sort of depth” (ibid.: 8). This highlights the importance of noting the causality of absence (for example, absence of adequate nutrition can propel an informed desire to grow a vegetable garden or organise social grants for those in need), as well as the fact that absence is present beyond the actual (experiences and events) but also in the structures and mechanisms that exert power in society. For example, beyond a child’s experience of coming to school hungry and unable to concentrate, and the event of having had no breakfast and her caregiver (if there is one) having no social grant and insufficient knowledge and/or power to arrange one, is the (historical in this case) structure of apartheid with its educational and other oppressive (Power2) mechanisms that deprived people of knowledge of their (human) rights and a voice to claim these or related social justice advantages or benefits. These historical mechanisms still can exert power in contemporary South Africa especially in situations of endemic poverty as described above, and can even feed other oppressive contemporary structures and mechanisms (such as a rural community’s dependence on labour on large minority-white-owned farms or plantations to make a living) that exclude the rural poor from opportunities to improve their lives. This is illustrated in a study by Klerck and Naidoo (2011) focusing on farm labour in the Eastern Cape. These researchers conclude that despite the introduction of minimum wage law in South Africa, underlying structures have not changed so that farmers are able to “offset any rise in wage costs ... through work intensification, ‘flexible’ employment policies, selective compliance [with respect to the minimum wage law], and adjusting non-wage variables such as hours of work or fringe benefits and increased deductions for rent and amenities” (ibid.: 308). This situation means that the transformative intent of the minimum wage law is distinctly undermined.

2.4 STRUCTURE, AGENCY AND CHANGE

Central to understanding social change, is an understanding of the relationship between social structures and agency in society. Bhaskar’s “transformational model of social activity” (TMSA)

(Bhaskar, 1998b) is a useful basis from which to start this discussion. The TMSA illustrates that social structures and human agency are mutually interdependent through the argument that “social structure is a necessary condition for, and medium of, intentional agency, which is in turn a necessary condition for the reproduction or transformation of social forms (Bhaskar, 1993: 154); yet social structures and human agency are, at the same time, irreducible. Social structures may either enable or constrain agency and human agency may either reproduce or transform social structures (see Figure 2.1 below). For example, the introduction of teacher portfolios can enable more structured and reflexive teaching, but has the potential to constrain teacher agency if it becomes overly managerial or authoritarian. Teacher agency may result, for example, in the **reproduction** of support for large scale mono-crop agricultural practices, through an emphasis on agriculture as an employment opportunity and as an important contributor to Gross Domestic Product. In another scenario, but working with the same curriculum structure, a teacher could enable the possibility for **transformed** agricultural practices through broadening possible scenarios to include, for example, self-employment, multi-cropping and organic agriculture.

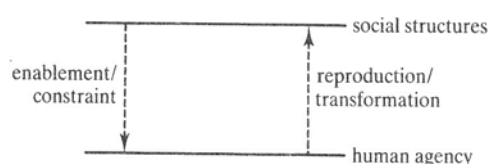


Figure 2.1 The transformational model of social activity (Bhaskar, 1993: 155)

Contrary to a voluntaristic view of structure/agency where society is epiphenomenal to social agency, and contrary to a reified view where human subjects are seen as epiphenomenal to societal structure, and contrary to a conflationist view of individuals and society as “two inseparable aspects of the same entity”, this model presents individuals and society “as two ontologically distinct entities, related in terms of emergence” (Hartwig, 2007: 468-469). Hartwig explained this emergent relationship as “society is both the ever-present condition for human action, and as such both enabling and constraining. On the other hand, society exists only in virtue of human agency” (ibid.: 469).

Norrie (2010) explained Bhaskar’s emergent view of structure and change as linked to the notion, attributable to the philosopher Heraclitus, that:

*In the same rivers ever different waters flow ...
We step and do not step into the same rivers ...* (Barnes, 1987 in Norrie, 2010: 207)

This quote presents the sense of the river as a structured whole into which we can step twice; as well as another sense of the river in a constant state of flux due to its flowing and ever moving water molecules. Considering these two senses of a river present a paradox in which it is possible to step into the same river twice and, at the same time, it is not possible. In the metaphor we see the inevitability of change. Whether we only stick our toe in the river, jump into the river, float in a boat

above the water, float with the tide, swim counter-current, get stuck in an eddy, or even sit on the bank of the river; the moment we engage with the river, we are in the process of becoming. Our agency in the system is effected whether our actions are passive (by sitting on the bank we might contribute to the hunger of a passing crocodile!) or active on a small scale (the shadow of our dipping toe might protect a lurking mayfly) or large scale (we could dam or divert the river, or dump effluent from a factory into it). We also see the [relative spatio-temporal] ‘endurance’ of generative mechanisms (Section 5.2) in the meanders of the river, the shallow banks of calm water, and the boulders, which are susceptible to constant slow wearing and occasionally a violent flood which redirects the course of the river.

Considering the river analogy in the light of the South African curriculum, there have been three cases of ‘violent floods’ in the reworking of the curriculum since 1994. There have been divergences in the river through, for example, different interpretations of constructivist curriculum underpinnings. In the spirit of a ‘new South Africa’ few people have felt the need to swim against the current of curriculum change, even though many have swum with the current while waving warning flags: Over-complex! Skills-biased! Teaching strategies! (Dada et al., 2009; Jansen & Sayed, 2001; Nelson Mandela Foundation, 2005). In the meantime teacher educators have been launching boats, and handing out snorkels and swimming gear in the form of teaching strategies, assessment tools, frameworks such as the active learning framework, and learning and teaching support materials.

With respect to the reproduction of structure, Bhaskar (1993) argued that it is necessary to consider that there is also a negative generalisation of the TMSA. He argued that:

A structure may survive in one of more of the following modes:

- (i) **without** any human agency, and even ... despite any human agency
 - (ii) in virtue of our (conscious or unconscious) attentive or inattentive ... **inaction**;
 - (iii) in virtue of our **compliance** or our passive or tacit acquiescence (or, in virtue of our neutrality or ‘neuistic’ indecision); and /or
 - (iv) in virtue of the **indirectness** of the human agency which reproduces it”.
- (1993: 158, emphasis original)

For example, corporal punishment (as a persistent historical structure) still exists in South African schools despite human agency which established a law that forbids it in schools (Nelson Mandela Foundation, 2005). Corporal punishment continues without the agency of principals in enforcing this law (i), and with conscious inaction on the part of those that believe that to stop the practice of beating children is a “mistake” (ibid.: 41) (ii), with inattentive inaction in the form of absent parents to provide gentler guidance for children (ii), with the passive acquiescence of those who watch the practice but do not have the power or confidence to stop it (iii), and with a society rife with violence against children (ibid.) indirectly supporting the institutionalisation of violence (iv).

Bhaskar argued (ibid.: 1993: 160, emphasis original) that there is “a sense in which the positive and negative, paradigmatically, may be considered to mutually presuppose each other, both conceptually and causally, all the *decisive* moments in social life are *negative*”.

Elaborating on Bhaskar’s TMSA model, Archer (1998b: 373) highlighted the irreducibility of structure and agency as “non-conflationist” – entailing different disengaged phases “not as mere aspects of a unitary process, but as parts of a temporal sequence”. She added that previous and subsequent cycles of reproduction (morphostasis) or transformation (morphogenesis) need to be acknowledged, that is, anterior and posterior cycles respectively. While acknowledging an implicit temporality in Bhaskar’s model, Archer stressed the importance of historicity in understanding structure/agency relations and pointed out this particular feature in her model of morphogenesis/stasis (see Figure 2.2). This model illustrates three phases of 1) structural conditioning, 2) socio-cultural interaction, and 3) structural elaboration, each with a finite, but overlapping, time span, and with clear possibility for preceding and subsequent cycles:

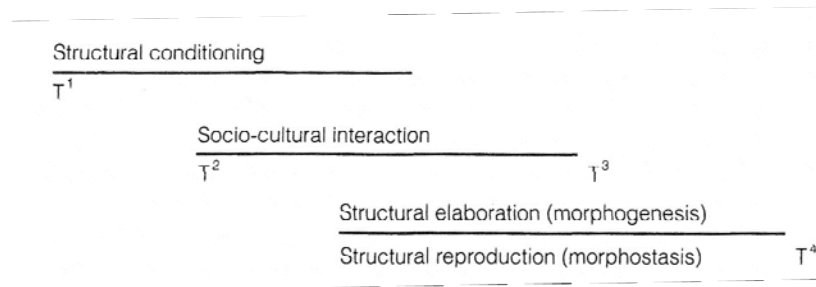


Figure 2.2 Morphogenesis/stasis cycle (Archer, 1998b: 375)

Bhaskar (1993) elaborated on his original TMSA in *Dialectic: The pulse of freedom* through his model of the ‘four-planar social being’ for understanding developing human nature in society. This model is illustrated in Figure 2.3 below:

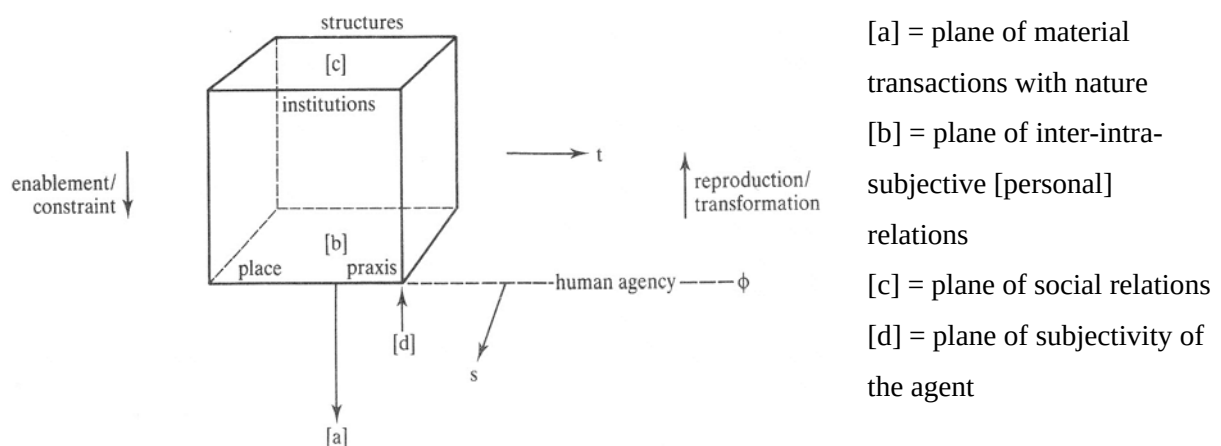


Figure 2.3 Four-planar being encompassing the ‘social cube’ (Bhaskar, 1993: 160).

The model introduces an explicit temporal element (through the symbol ‘t’) not present in the model represented in Figure 2.1 as well as an element of space (‘s’). Bhaskar explained this “tensed socio-spatialising process” (1993: 160) as having four modes:

(α) existential constitution: “any entity contains within it, as part of its being, the process that constituted it. Since process is spatio-temporal ‘becoming and begoing’, we are existentially constituted by what is now apparently absent because [it is in the] past” (Norrie, 2010: 32);

(β) co-presence: “the past may be encrusted, embedded in a landscape, say, or as an active part of the present” (Bhaskar, 1993: 141);

(γ) lagged or delayed efficacy: the past exercises causal efficacy on the present but this may be “delayed potential or realized efficacy” (Bhaskar, 1993: 141);

(δ) agentive perspectivity: Bhaskar explains that from the perspective of the agent, “wherever she goes, ‘metaphorically’ there has always been someone else before, She is always – from birth to death – living in a pre-constituted world. She is always living in the past” (Bhaskar, 1993: 141-142).

To investigate the manifestation of active learning processes as transformative praxis, it is necessary to take into account how spatio-temporality influences teacher and learner agency in responding to environmental issues and concerns. Questions such as the following become relevant:

- If historically, South Africa has had a legislated policy of separate development which still manifests spatially in the sense that the Eastern Cape is **existentially constituted** by past ‘homelands’, then how will the ongoing alienation in these areas from the resources and wealth of the rest of the country (Section 1.6) manifest in a school trying to grow vegetables on degraded land with few financial and practical resources?
- If transformative praxis is dependent on processes of deliberation and co-engagement, then how might such democratic processes manifest amongst people **existentially constituted** by exclusion from a democratic order in an apartheid past?
- The history of rote learning (Section 1.1) is embedded in teacher practice today, thus illustrating a **co-presence** of transmission teaching in a progressive curriculum emphasising “learner-centredness, active learning, problem-solving, critical and creative thinking, an understanding of the world, and the skills of evaluation and analysis” (Nelson Mandela Foundation, 2005: 81). How might this co-presence affect respect for the “autonomy of knowledge” (Section 4.3.1) amongst teachers and learners?
- What is the effect of an ongoing reversion to theme-driven environmental learning (driven by the use of environment as a phase-organisier in Curriculum 2005) **co-present** in educational practices despite an attempt to emphasise the primacy of subject knowledge in the RNCS (Section 1.3)?

- What is the **delayed efficacy** of situations where children, in early years, are not exposed to a culture of reading and writing in homes with an absence or high levels of illiteracy amongst parents?
- What is the role of **agentive perspectivity** in reflexive classroom practice? For example, how can knowledge that South Africa has ‘been there before’ with a content-based curriculum (Section 1.3) enable engagement with content knowledge in the CAPS in a manner supportive of critical thinking rather than knowledge transmission?
- What are the possibilities for strengthening transformative praxis through involving parents in sharing indigenous knowledge and practices with the understanding of **agentive perspectivity**? For example, when teaching about nutrition, traditional Xhosa practices of souring milk to feed to children, remind us that previous cultures have tread the same ground regarding the health and strength of their children (Hanisi, 2006).

This last example cited above illustrates a ‘positive mode’ of temporality. It was chosen considering Bhaskar’s statement that across these four spatio-temporal modes it is important to note that:

The past may be present as transfactual or actual, latent or manifest, agentive (and, if so, as living or dead) or not; it may have been continuously or discontinuously present; it may be internally related to other elements of the past and/or present and/or to processes oriented to and/or in anticipation of the future, and it may be present in a positive or negative mode. (Bhaskar, 1993: 141)

Across all the above examples, a spatial element can be elaborated through questions such as: In what province? In rural, urban or peri-urban context? Or in what (place-influenced) socio-economic contexts? In Section 5.2, the implications of knowledge of spatio-temporality in understanding causality are elaborated.

Besides spatio-temporality, the four-planar model has another feature – not elaborated in the previous two models – that is a consideration of the different realms at which human-beings operate – the four planes of the above diagram. Norrie explained that these planes “expand the elements necessary to speak holistically about human being in both the natural and social worlds” (Norrie, 2010: 115). Bhaskar explained that “every social event happens in at least four dimensions” (Bhaskar & Parker, 2010: 9). The planes listed in Figure 2.3 are elaborated below:

- At plane [d] – of subjectivity of agent – we are concerned with the stratified self. Norrie, drawing on Bhaskar, elaborated that:

first there is [an individual]’s life narrative, her biography. Second there is her stratified internal personality taking the form of ‘the lagged causal efficacy of her unconscious, her unwritten biography’. Both elements go towards ... the stratification of her personality. (Bhaskar, 1993:163 in Norrie, 2010: 115)

- At plane [c] – of social relations – we are concerned with an agent’s engagement with structures, institutions and forms (ibid.: 115). In this plane “structures and mechanisms in the social world are just as concretely real as the objects in the intransitive realm of the natural sciences (although perhaps not as enduring); and ... can have natural tendencies and properties which are just as causally efficacious” (Shipway, 2001: 66).
- At plane [b] – of inter-intra-subjective [personal] relations – we are concerned with an agent’s “interpersonal relations with differently situated agents” (ibid.: 115) or “transactions with ourselves and others” (Hartwig, 2007: 421).
- Plane [a] – material transactions with nature – Bhaskar (1993: 209) explained that this includes “material objects generally”.

In a hypothetical example of a Xhosa child in a peri-urban school: Her life narrative might include a culture of political struggle, a poor socio-economic background, a history of limited formal education in her family, and more (plane [d]). At plane [c] social relations might determine a sense that her language (and associated knowledge of traditional uses of plants) might lead to exclusion from socio-economic access and mobility (Section 1.4). At plane [b] she might develop a sense of self and relations with her peers that absorbs her into a ‘fast food culture’ at plane [a] from which she might experience illness or obesity due to unhealthy eating practices. However, four-planar social being also embraces the possibility of transformation. Thus she could, at plane [d], talk to her grandmother about wild fruits eaten by children in the past. At plane [c] she might ask her grandmother to show her where to collect these wild fruits and share these with her friends at school. At plane [b] she might reflect on her enjoyment of her interaction with her grandmother and friends. Finally at plane [a] she might develop a new sense of agency through drawing on practices of the past and continue to explore and experiment with these.

Bhaskar intended the diagram of four-planar social being to be thought of as a “cubic flow, differentiated into analytically discrete moments ... as rhythmically processual and phasic to the core” (1993: 160). The phasic nature is represented by the emergent planes – emerging in phases from [d] through to [a]: from plane [d], the structural conditioning of the agent, to plane [c] where agents engage with (or mediate) this conditioning, to plane [b] where agents engage with each other and potentially engage reflexively with their own situation, to plane [a] where agents might instigate change in their environment/surroundings.

Bhaskar’s definition of rhythmic as a “tensed spatializing process consisting in the exercise of the causal efficacy of a structure or a thing; which, as such, may have supervenient causal powers of its own” (Bhaskar, 1993: 403) illustrates that, while the phasic nature of the notion of four-planar being

allows us distinct moments of analysis, the spatio-temporal and causal complexities of the model will not allow us to oversimplify our descriptions and explanations of society. The distinct moments as represented by the four planes are paralleled by the MELD schema which is discussed in Section 2.6, but before moving on to this discussion, certain ideological sub-dimensions of four planar being are discussed below.

2.5 IDEOLOGICAL UNDERPINNINGS OF FOUR-PLANAR BEING

Bhaskar explained that planes [c] and [b] both have legitimising and/or motivating ideologies which may be competing and antagonistic. Figure 2.4 illustrates three relations which meet at a “nexus of competing and antagonistic ideologies”: Power₂ relations, discursive/communicative relations, and normative/moral relations.

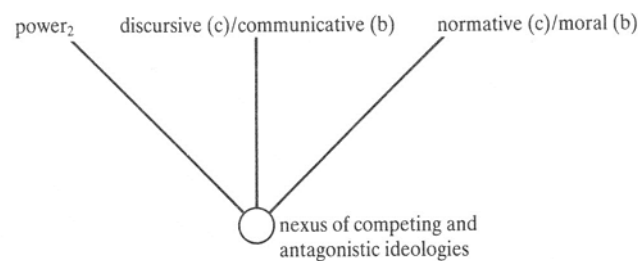


Figure 2.4 Ideology as an intersect of three sub-dimensions of the social cube (Bhaskar, 1993: 161)

At plane [c] Bhaskar identified discursive and normative sub-dimensions of structures and institutions. The normative sub-dimension can be interpreted as providing a platform – “the intransitive morality of an always already moralized (or a-moralized) world” (ibid.: 161) - for social relations with agents; or a set of social norms which dictate certain moral imperatives to members of society. An example of this is the normative framework of the South African national curriculum which emphasises human rights, social justice, inclusivity and a healthy environment (Lotz-Sisitka & Schudel, 2006). When agents engage with these social norms they draw on the cognitive domain of human reason where they develop “discursive knowledge *that* (beliefs), driven partly by the basic instinct of curiosity but also by desire to meet needs and absent constraints on flourishing” (Hartwig, 2007: 19), as is the case with environmental and social justice policy discourse as described above. The distinction between the cognitive domain and the performative domain (where knowledge *how* is emphasised) will be revisited in the following section.

Bhaskar explained that the relations at plane [b] have “communicative and moral sub-dimensions” (Bhaskar, 1993: 153). The moral sub-dimension in this plane is underpinned by the affective domain of human reason, which Hartwig (2007: 19) described as “the seat of the moral imagination and

optation (e.g. hope), issuing in values and sentiment”. These values and sentiments are communicated at plane [b] by “transactions with ourselves and others” (Hartwig, 2007: 421). Thus a teacher wanting to intervene regarding the ‘fast food culture’ discussed above might involve learners in deliberative co-engaged active learning processes (Section 3.3.2) where values of healthy traditional practices (such as the use of sour milk or indigenous vegetables) are discussed amongst learners, parents and teachers in relation to the value and status attributed to buying one’s own food (a practice that can be attributed to a sense of socio-economic advancement).

The power2 relations in Figure 2.4 refer to the “transfactually efficacious capacity to get one’s way against either (i) the overt wishes and/or (ii) the real interests of others (grounded in their concrete singularities)” (Bhaskar, 1993: 153) or “negative characteristics such as domination, subjugation, exploitation and control that can be identified in given social structures” (Hartwig, 2007: 372).

Power2 might take the form of:

- *agent A making B do something that she would otherwise not do ...,*
- *the construction of compliance by the exclusion of known alternatives, narrowing choice,*
- *socialization such that the ‘worldview’ of individuals precludes an understanding of real interests. (ibid.: 372)*

In South Africa this was illustrated by the apartheid curriculum for black children which emphasised gardening and agriculture, but was resisted by its intended recipients (Nelson Mandela Foundation, 2005) as it was associated with a narrowing of ‘career’ choice and a view of the role of black people as labourers on farms or gardeners in the homes of the colonial rulers. In another example, a contemporary and popular environmental learning activity – that of making something useful from waste – could be construed as teaching those from poor social-economic backgrounds to ‘live off the waste of others’.

Power2 is a specific type of Power1. Power1 refers to:

The general causal powers of human agency whose characteristics entail the possibility of human emancipation, such as our capacity to investigate, communicate, plan, construct moral and ethical systems, feel and care for others, and come to agreement based on judgementally rational argument directed at practices that transform our lived circumstances. (Hartwig, 2007: 372)

The last concept key to understanding four-planar being is that of constraints. Bhaskar described a constraint as “an absolute or relative prohibition, whether natural or social and remediable or not” (Bhaskar, 1993: 161). Constraints2 are constraints exerted by Power2 relations on society. For example, teacher portfolios ministered with an emphasis on managerialism (Power2 relationship) can result in Constraints2 in the form of an administrative burden detracting from teaching and learning. Constraints1 are not linked to Power2, and may be “socially caused, and, as such the object of rational

transformative praxis, but some such constraints (such as those imposed by the laws of nature, and material, ecological, [spatio-] temporal, ecological, entropic, and axiological asymmetries to which social life is subject) must be taken as unsurpassable” (Bhaskar, 1993: 161). In the case of waste management, a socially caused Constraint¹ might arise from the absence of a waste management plan in a remote school (too far for municipal services to be feasible); while out of this an axiological asymmetry might arise regarding the choice to either burn the waste (and contribute to air pollution and lung complaints) or to try to manage the waste by ‘disposing’ of it in a hole dug in the school grounds (where it is open to scavenging animals and susceptible to being blown about by the wind). A constraint should be seen as a negative form of causality (stops or has the capacity to stop something happening) as opposed to enablement which is a positive form of causality. It is also possible to negatively generalise the notion of constraint so that “to constrain an ill is to disempower, contradict, overthrow or otherwise constrain a constraint” (Bhaskar, 1993: 277). For example, to extend the waste management example, a constraint on consumption (the act of reducing, as opposed to re-using or recycling) will be to constrain the constraint exerted on ecosystems exerted by over-consumption. Thus agency is enabled or constrained by structural conditioning in a way that may be contradictory, supportive, malign or benign (Hartwig, 2007: 294). Understanding these complexities is more than a game of infinite ‘knock-on-effects’, but is crucial to identifying false beliefs and personal or social ills in the type of explanatory critique Bhaskar proposes for explaining society (Section 5.2).

2.6 THE MELD SCHEMA

As mentioned above, Bhaskar’s notion of the dialectic is a ‘renovated’ Hegelian dialectic. The Hegelian dialectic has three elements: identity, negativity and totality. Identity is about what makes a concept or a thing in itself distinct from something else, negativity is about criticism of that identity leading to contradiction, and totality is about addressing the negativity in the context of the whole (Norrie, 2010: 12). In his dialectic, Hegel “starts with *identity*, submits it to a *negative* critique, and then shows how the results of this *negativity* can be addressed when viewed in the context of the whole, the rational *totality*” (ibid.: 12). Bhaskar (1993: 74) critiques the Hegelian dialectic for committing the epistemic fallacy, or the “hypostatization of thought”. By ‘epistemic fallacy’ he is referring to “statements about being in terms of statements about our knowledge of being, the reduction of ontology to epistemology” (ibid.: 4).

In a discussion of Hegelian philosophy, Norrie (2010: 60, emphasis original) illustrates the application of the notion of the epistemic fallacy when he explains that Hegel ...

... emphasises thought’s speculative resolution of contradiction in a fuller, more rational understanding of the world, but this means that the actual world, with its existing contradictions, becomes the rational world. The result is that there are real

contradictions in the world, Hegel has no way to resolve them, and they return as unresolved contradictions in his philosophy.

The similarities and contrasts with Bhaskar's dialectic are elucidated in the following discussion where Bhaskar's MELD schema is described. Bhaskar's MELD schema is a series of stages in the process of change detailed in his book *Dialectic: The Pulse of Freedom* (1993) which represent the "unfolding of being" and which constitute the "ontological-axiological chain in a four-sided dialectic" (Hartwig, 2007: 296). The relation between the title and sub-title of this book is described by Bhaskar as follows:

Dialectic is the yearning for freedom and the transformative negation of constraints on it. It depends upon the positive identification of the existentially intransitive existence of absences and their transfactually efficacious, A-serial rhythmic, totalising, agentive elimination in a praxis from desire via truth to freedom, practically mediated by wisdom. The strength of its presence is the measure of the pulse of freedom — of its health, or transformative power. (1993: 378)

The following four sections elaborate on each stage in the MELD schema.

2.6.1 The First Moment (1M): Non-identity

The first moment (1M) in the ontological-axiological chain is concerned with non-identity. This begins firstly with sheer, real difference that exists in the world. This is "a world, both natural and social, in which things happen according to causes and the nature of entities, independently of our understanding of them" (Norrie, 2010: 13). This is contrasted with Hegel's "thought identity" which emphasizes "thought in constituting the real" at the level of the "actual" (ibid.: 12). This leads, secondly, to an understanding of a distinction between intransitive and transitive dimensions of reality with an emphasis at 1M on intransitivity. Shipway distinguished between these dimensions as follows:

The intransitive dimension is made up of real things and structures which have their own powers and tendencies, and are causally efficacious. It is where the objects of knowledge abide. The transitive dimension contains the historical and culturally located theories which attempt to explain the real things, structures, and phenomena in the intransitive dimensions. The transitive dimension is the realm where scientific theories reside. (Shipway, 2001: 59)

The first moment is concerned with ontological stratification (including the stratified self at plane [d] as described in Section 2.4) (Bhaskar, 1993: 231) and transfactuality. Stratification and transfactuality were introduced briefly in Section 2.1 as a view of reality including generative mechanisms that exist beyond the empirical experience and beyond the manifestation of events.

The interest in generative mechanisms is further deepened by the notion of 'laminated systems' which Bhaskar describes at 1M as "conjunctive multiplicity or laminated totality constituted by several

ontologically distinct but interacting mechanisms” (Bhaskar, 2010: 14) . The idea of laminated systems is presented in Danermark’s (2006, in Brown, 2009) laminar conception of disability as comprising physical, biological, psychological, psycho-social, socio-economic, cultural and normative mechanisms.

Absence, at 1M is seen as product as described in Section 2.3 above. That is “absence of any entity or feature from consciousness (e.g. the unconscious) or from a space-time region (resulting from distanciation or mediation, death or demise) or ... simple non-existence anywhere, anywhen” (Bhaskar, 1993 in Hartwig, 2007: 9). “It connotes, inter alia, the hidden, the empty, the outside; desire, lack and need” (Bhaskar, 1993: 5). In the environmental field, the ‘hidden’ may refer to countries with a large ecological footprint focusing attention on production in their industrial sector and failing to report the additional carbon footprint created by consumption in their society (Frank, 2010); the ‘empty’ may refer to the absence of significant funding for alternative technologies that might reduce the country’s carbon footprint; and the ‘outside’ might refer to the exclusion of socio-economically marginalised communities from access to the benefits of the industrial sector such as new energy technologies that improve basic health. It may refer to an ‘absence of desire’ for reduced patterns of consumption amongst society in general, ‘lack’ of knowledge about the environmental implications of high levels of consumption (that is, “not knowing what is not known” (Lotz-Sisitka, 2011)), or a basic ‘need’ that is dependent on industry to provide.

Hartwig explained that action has “five ‘componential springs’ or bases, which are constellationally contained in the concept of *reasons for acting*”; and the basis for acting at 1M is driven by the conative domain, conative referring to any natural tendency, impulse, striving, or directed effort) (Hartwig, 2007: 19). This domain represents the absences described above – it is the “home of absence in the form of desire, including will, and of motivations and drives, producing wants” (ibid.: 19).

In describing the agent at 1M, we are concerned with “a **core universal** human nature grounded in (but not reducible to) a shared (but also unique) (i) genetic constitution, (ii) transcendently real or essential or alethic self, and (iii) ground-state (ultimate implicitly conscious field of potential)” (Hartwig, 2007: 444). The transcendently real self can be seen as one that transcends empirical experience; and which is influenced by the alethic truth, namely, “the truth of or reason for *things* and phenomena, *not propositions*, as genuinely ontological, and in this sense as objective in the intransitive dimension” (Bhaskar, 1993: 217). Bhaskar elaborated on the ground state by describing the qualities in human beings of “energy, intelligence, creativity, love, capacity for right action” (Bhaskar, 2002a: xiii). Hartwig (2007: 243) pointed to some manifestations of the core universal in the form of powers (such as to acquire and use language), needs (for autonomy) and wants. At the

level of 1M, we are not looking for universal rules but dialectical universalisability where we find “universal needs and potentials, rights and freedoms at the level of the real, which, however, are only ever manifest in particular mediated and singularized forms, and which actually existing norms may more or less adequately express” (Hartwig, 2007: 491). Describing significant features of 1M would also include consideration of “dispositional identity of things with their changing causal powers” (Bhaskar, 1993: 77), which is significant to Bhaskar because “in a dialectical kinetic pluriverse to be is not only just to be able to do, but to be able to become” (ibid.: 77).

Applying these ideas to questions of food security: At 1M the interest is in: What is possible (such as the capacity of the soil to grow food and human disposition to do so and human capacity for collaborative action); what is impossible (to grow food without water, fertile soil and security from animals or thieves); and what is problematic about what is impossible (absence of food security in the presence of high unemployment, inadequate social security, drought and degraded land)? This, for example, might drive us to ask whether a person who steals food to feed her child is a criminal or simply a ‘mother’.

1M, therefore, is a stage in social being that is important for understanding how active learning emerges from a context of poverty and inequality and links to the conative domain of human reason with a focus on absences or ills related to health, ecology and human well-being associated with this context. These absences or ills manifest in the form of desire, lack and need.

2.6.2 The Second Edge (2E): Negativity

Bhaskar’s Second Edge (2E) is concerned with negativity, but is different to Hegel’s negativity in that it emphasises the notion of absence (not only contradiction as with Hegel). At 2E absence is seen as a process. 1M was about ‘being’ and the process of 2E ushers in the dialectic as a process of ‘becoming’. Norrie (2010: 15) described becoming as “the absenting of what was in favour of the emergence of what now is, for every becoming is also, in some part at last, a ‘begoing’, an absenting of what was there”. Absenting is, for example, what happens at the moment of curriculum elaboration. A teacher might neglect to cover an important ecological concept that is elaborated in the textbook, or might absent the absence of a suitable teaching strategy for engaging with complex axiological asymmetries by introducing, for example, a debate or role play into the classroom. Hartwig elaborated by explaining that 2E is concerned with emergence as process where “the causal powers both of structures and of the human agency which reproduces them are exercised and their effects realized” (2007: 29). This means that at 2E we move beyond a concern with difference (Section 2.3) to an interest in change and in rhythmic identity described by Bhaskar as the moment when the:

Causal powers [of things] must be exercised, so that the constellational identity of (embodying the distinctions between) structures, mechanisms and spatio-temporal processes manifests itself in the rhythmic identity of those changing causal powers with their spatio-temporal exercise. (1993:77)

At 2E is the ushering in of dialectical argument – “a form of transcendental argument in which the ontological necessity of false (or limited) premises, categories or results is established” (Bhaskar 1993: 396) or in which “the conditions of possibility ... of the conditions of impossibility” are established (ibid.: 46). Hartwig explained ‘necessary’ as referring to “caused” or having “ontological conditions of possibility” and false as “limited, incomplete, incoherent ...” (Hartwig: 2007: 129). Here attention is called to “inconsistency or contradiction” (ibid.: 130). In a debate or role play as proposed above, or other curriculum elaboration such as a structured interview or enquiry in the school or children’s homes; this would require questions, such as: How is it possible that our school is full of litter, considering waste legislation prohibiting this? Or how is it possible that there are children coming to school hungry when children are constitutionally guaranteed a right to adequate nutrition?

With questions such as the above 2E becomes concerned with the cognitive domain which contributes to an agent’s reasons for acting. This domain provides “discursive knowledge *that* (beliefs)” (Hartwig, 2007: 19). This is knowledge “driven partly by the basic instinct of curiosity but also by desire to meet needs and absent constraints on flourishing” (ibid: 19). Action at this level is driven by thought and creativity (ibid.: 230) as agents engage at plane [c] with social structures, institutions and forms. It is at 2E that we encounter an “alethic truth of falsity” (Bhaskar, 1993: 262), “concerning how people live, for example under structures that alienate them, and the beliefs those structures engender” (Norrie, 2010: 130).

2E emphasises three things: “[firstly] the tri-unity of causality, space and time in tensed rhythmic spatialising process; [secondly] thematising the presence of the past; [and thirdly] existentially constitutive process” (Bhaskar, 1993: 392). These concepts were discussed in Section 2.4 with respect to the spatio-temporality of four-planar being.

Corresponding to 2E, we have distinctive emphases in the diachronic process of change, in the formation and dissipation of laminated totalities. Thus we can differentiate dialectical and entropic types of change, together with various forms of stasis or reproduction, or differentiate evolutionary from revolutionary processes of change. (Bhaskar & Parker, 2010: 14).

Thus at 2E we have “the meshing of explanatory mechanisms at several different levels of reality and possible orders of scale” (Bhaskar & Parker, 2010: ix).

The idea of entropy can be elaborated through Bhaskar's (1993: 50) explanation that our world is an "open-systemic entropic totality, in which results ... are neither autogenetically produced nor even constellationally closed, but the provisional outcome of a heterogeneous multiplicity of changing mechanisms, agencies and circumstances".

In the case of an environmental education activity where learners are deciding on how to manage an outbreak of aphids in their garden, we can imagine a dialectic process where, based on the logic of ecosystems, the valuing of human health and 'helpful pests', and the acknowledgment of ecological and financial constraints, they consider using an organic pesticide made from garlic and soap. However, this would not be the only possible course of change. Out of fear of losing an important food crop they might want to ensure a quick and sure (revolutionary) solution and buy an insecticide to eliminate the infestation or they might decide to squash the insects by hand if they have no access to garlic and a spray bottle. Operating from a Buddhist perspective of care for all living things, they might decide on an evolutionary approach where they plant garlic next to their other vegetables to deter aphids, strengthen the plants through composting and mulching with the understanding that healthy plants can survive an aphid infestation better, or grow marigolds to attract predators to eat the aphids. These are examples on a small, local scale. Applied to a larger-scale problem such as the growing of cash crops, more complex and numerous laminations of totality are evident. Consideration needs to be given to wage-labour in a capitalist system; ecological impacts on water availability and health, soil fertility and health, biodiversity and health; effects on subsistence living; and more. Out of experience with working on their own local dilemma, learners might be able to apply similar decision-making processes to reflect on evolutionary options such as encouraging medium-scale community gardens with the option of entering the organic food market, or revolutionary options for regaining self-employment and economic power such as in cases in South Africa where a national Restitution of Land Rights Act (No. 22 of 1994) is being employed to facilitate claims for "the return of land rights to persons or communities dispossessed ... without equitable compensation as a result of past discriminatory laws or practices" (Koning, 2010: 41).

2E as described above has relevance for an active learning interest in exploring and understanding (scientifically, socially, spatially and temporally) the nature and causes of absences and possible absencing processes in the cognitive domain of human reason. 3L as described below is the level at which these options and implications at varying degrees of scale are considered from an ethical standpoint so that we are not left with a relativist dilemma of no way forward.

2.6.3 The Third Level (3L): Totality

Bhaskar's Third Level (3L) is different from the Hegelian (rational) totality in that Bhaskar sees "the 'whole' as real, open and unfinished" (Norrie, 2010: 12). Whereas Hegel proposed imposing a rational order on the world at the level of totality, through "negative critique and positive restoration of identity" (ibid.: 12), Bhaskar called for "practical wisdom and the unity of theory and practice" supported by reflexivity (the inwardised form of totality) (Bhaskar, 1993: 9). Instead of imposing a rational order on society, change is considered in the context of its holistic place in society or the holistic whole (as discussed in Section 2.2) and is considered to be a "a move to greater completeness" generated by inconsistencies "caused by incompleteness (some relevant conceptual or empirical absence)" identified at 2E (Hartwig, 2007: 175). For example, a learning activity to develop a school garden using permaculture techniques can be seen in the context of social movements worldwide searching for alternative farming practices with the possibility for creating a system "constituted by a multiplicity of complementary locally-specific combinations and variations, each adaptable to its social-ecological environment" and, in this way contributing to food sovereignty – "the right of peoples and sovereign states to democratically determine their own agricultural and food policies" (Lacey & Lacey, 2010: 188-199).

In this example, we also see a concern with concrete utopianism which, Bhaskar explains, "consists in the exercise of constructing models of alternative ways of living on the basis of some assumed set of resources" (1993: 395), and functions to "pinpoint the real, but non-actualised possibilities inherent in a situation, thus inspiring grounded hope to inform emancipatory praxis" (Bhaskar, 1998b: 215). Put more simply Bhaskar describes concrete Utopianism as playing a "role of creative fantasy ... that yields at once hope **and** possibility" (1993: 209, my emphasis). Bhaskar elaborates on the meaning of 'alternative ways of living' by specifying that concrete utopianism "involves thinking about how a situation of the world could be otherwise, with a change in the use of a given set of resources or with a different way of acting subject to certain constraints" (Bhaskar, 2010: 22). This means a need to consider what we have got and how we can realistically work with it so that we aren't misleading ourselves with idealistic propositions.

Bhaskar sees this level as "the spot from which we must act, the axiological moment" (1993: 9) and it is at this level that the ethical deliberations central to an explanatory critique (see Section 2.1) come into play. The reasons for acting at this level are seated in the *affective domain* which can be described as "the seat of the moral imagination and optation (e.g. hope), issuing in values and sentiment" (Section 2.5).

Bhaskar insisted that:

moral judgements [should be] logically or necessarily universalisable: if you say or imply that someone should ϕ then you are yourself committed to ϕ -ing in materially similar circumstances; this provides both a test for theory-practice consistency and a criterion for the truth of what you are saying. (Hartwig, 2007: 491)

This is significant, particularly in a country such as South Africa which has such high levels of inequality (Section 1.6). Thus it becomes problematic to propose a dry toilet, for example, in an impoverished community that sees flushing toilets as a sign of upward social mobility, unless all members of society (including the historical elites) change to using dry toilets.

The agency envisaged at this level is not open to de-agentification which Bhaskar elaborated to explain:

This may take the philosophical forms of (dualistic) disembodiment or (reductionist) reification, manifesting itself sociologically in the enervation or fragmentation of agents or groups, impotent empty selves, fissiparousness and alienating retrojective, introjective, projective, etc. modes of identification (e.g. in a fantasy world). (1993: 296)

This can be related to Section 3.4 which discusses the problem of reified or Utopianist visions in environmental learning practices.

3L is also associated with relationships within a laminated totality. Bhaskar explained further with the following:

I have already noted the emphasis at 1M, that of a conjunctive multiplicity or laminated totality constituted by several ontologically distinct but interacting mechanisms. The emphasis at 3L is on their relationship of dependency and interdependency, and of their characteristic patterns of interaction and intra-action. (2010: 14)

At this level we are concerned with holistic intra-action of component parts within a system which may themselves contain “component parts in holistic intra-action” (ibid.: 7). Also between the component parts and the whole is a relationship of ‘holistic causality’ explained by Bhaskar as:

when a complex ‘coheres’ in such a way that: (α) the totality, i.e. the form or structure of the combination, causally determines the elements; and (β) the form or structure of the elements causally codetermine each other, and so casually (α') determine or (β') codetermine the whole. (1993: 127)

For example – consider the educational, teacher professional development and social-ecological context of emergent active learning processes briefly introduced in Chapter 1. The educational component is made up of a number of component parts such as, the curriculum structure presented in formal documents, possible learning and teaching support materials and methodologies to engage the curriculum, practical resources (such as pens and paper) to enable curriculum engagement, and available infrastructure within which teaching takes place. The teacher professional development

component is made up of the ‘knowledge capital’ which teachers and tutors bring from previous training courses, models of teacher professional development, and course materials. The social-ecological component is made up of components such as natural resources (soil, water, air, seeds), a socio-political history of land appropriation and forced removals of certain ethnic groups, and current employment opportunities and conditions.

The above-mentioned complexities highlight the importance at 3L for deliberation over which absencing possibilities are morally most defensible. It is at this level that the need for judgemental rationality (Section 2.1) becomes important. Thus 3L, as described above, has relevance for active learning’s explicit change or counter-hegemonic interest (Section 3.3.) and the need to construct visions for sustainable living that stands up to tests of truth and normative judgements (Section 3.4).

2.6.4 The Fourth Dimension (4D): Transformative agency

Norrie explained that 4D encompasses “the capacity for practical human agency to change the world” (2010: 12). At 4D judgements are “expressively veracious” (Hartwig, 2007: 299) which Norrie described as expressing a truth about how you think a person should act “with the universalising implication that this is what you and others would do in exactly the same situation” (Norrie, 2010: 133). 4D is the moment of context-sensitive transformative agency where proposed change is specific to a particular individual and context (Hartwig, 2007: 299).

It is reliant on the “*expressive domain* – the locus of speech action, style etc., and the *performative domain* – the arena of practical action, ergonic efficiency and phronesis” (Hartwig, 2007: 19).

To elaborate on the terms in the performative domain: ergonic efficiency “concerns the efficiency (economy of energy, time, resources, etc.)” (Hartwig, 2007: 179), while phronesis refers to “good sense or practical wisdom” (ibid.: 362). The last performative term – practical action – can be explained by Bhaskar’s insistence that “4D consists not in practical reasoning but in (reasonable) practice – not the same thing at all” (Bhaskar, 1993: 13). In other words this is the stage at which change is realised, not simply theorised, and this change is founded on ontologically and ethically reasoned imperatives and understandings. 4D presupposes 3L reflexivity in order to achieve “active and reflexive engagement within the world in which we seek to achieve the unity of theory and practice in *practice*” (Bhaskar, 1993: 9, emphasis original). In order to analyse transformative praxis in this study, this has been interpreted as the unity of theory (how things work) and practice (what we should and can do) in practice (doing it in a particular concrete context). For example, a teacher in both the expressive and performative domain would do what is practically possible and morally defensible (for example engaging the community in a school-based permaculture garden which can

help feed vulnerable families and provide an income for able-bodied, previously unemployed community members).

Writing from an environmental change focus, Bhaskar highlights that “corresponding to 4D, we have a special interest in the extent to which human transformative praxis can play a role in influencing and modifying the laminated totalities at work in the social sphere” (Bhaskar, 2010: 14). The logic of laminated totalities appears to be at work, for example, in the following extract from the Millennium Ecosystem Assessment below:

Changes in drivers that indirectly affect biodiversity, such as population, technology, and lifestyle ... can lead to changes in drivers directly affecting biodiversity, such as the catch of fish or the application of fertilizers ... These result in changes to ecosystems and the services they provide ... thereby affecting human well-being. These interactions can take place at more than one scale and can cross scales. For example, an international demand for timber may lead to a regional loss of forest cover, which increases flood magnitude along a local stretch of a river. Similarly, the interactions can take place across different time scales. Different strategies and interventions can be applied at many points in this framework to enhance human well-being and conserve ecosystems. (Millennium Ecosystem Assessment, 2005: 11)

4D as described above, links to active learning’s interest in developing competence for action in response to social-ecological concerns in the world through ‘trying out’ ways of doing things differently in the world (Section 3.2). In the school context, we cannot expect learners to “solve community problems” (Section 3.4) or change all of the complex and multi-layered laminations in the social sphere. Through practical grounding, however, in 1M possibilities, explorations of absence and absenting processes at 2E, and 3L ethical reflections on laminated totalities, we can see possibilities for engagement at even one small but significant point, that can prepare learners to participate in broader transformative praxis as their responsibilities and opportunities for engaging with the world increase.

2.6.5 Closing reflections on the MELD schema

The MELD schema, if applied in order to understand the emergence of active learning as transformative praxis, can highlight 1M ontological questions of what **is** - such as laminated totalities; universal needs, potentials, rights and freedoms; and reasons for actions that are optimally grounding and liberating or which impose constraints on self-emancipation. 1M also highlights what **could be** (real, but non-actualised possibilities). The schema can also highlight 2E questions which reflect on what mediating and interactive **agential processes** either reproduce what **is** or have the potential to transform what **is** to what **could be**. A third consideration for change-oriented education is how do we decide what **should be** – this is the 3L “axiological moment” (Bhaskar, 1993: 9 – Section 2.6.3) where questions of values and ethics in relation to the holistic whole are raised. Finally, the schema

can raise questions at 4D of what **can** be, with ontologically grounded, context-sensitive and expressively veracious considerations.

When considering the MELD schema it is important to note that each level is not a separate independently acting phase, but that each element emerges out of the one before. This is evident in Hartwig's explanation that the MELD schema indicates:

Different moments of being-becoming, but dialectically in terms of (1) the vertical development of the CR system, such that each successor stadion presupposes or preservatively sublates its predecessor: $4D > 3L > 2E > 1M$; and (2) the unfolding of being as such (structure is ontologically deeper than its actualization at 2E, and 3L and 4D speak of emergent levels that are by definition diachronically more recent). (Hartwig, 2007: 296)

With respect to the purpose of this research, analysing emergent active learning processes in terms of enabling transformative praxis means analysing educational opportunities at all four levels of the MELD schema.

It should be noted here that Bhaskar has elaborated on dialectical critical realism and the MELD schema in his later theorising of meta-reality. He argues the necessity of meta-reality theorising as follows:

With the demise of historical socialism and the rise of bourgeois triumphalism in the late eighties and the nineties, the deficiency, absence or lack ... in the discourse and practice of critical realism and the Left in general is that insufficient attention is being paid to the spiritual dimension of human life, with the consequence that the Right is hegemonic in that area. [Hence a remedying of] this lack, through embarking on 'thespiritual exposition of being. (Bhaskar, 2002b: 21)

Meta-reality represents the third wave in the development of Bhaskar's critical realist philosophy, with original critical realism (Section 2.1) and dialectical critical realism (Sections 2.2 –2.6) representing the first and second waves respectively. The philosophy of meta-reality adds three more stadia to the MELD schema – these stadia focus on reflexivity, re-enchantment and non-duality respectively (Hartwig, 2007: 303).

The highlighting of spirituality is a pointer for further research into societal change, particularly in the environmental education field, in which issues such as those regarding animal rights or the intrinsic value in all beings raise complex axiological asymmetries. Frank (2010) noted how, in the environmental field, institutions are turning to “spiritual or secular ground state qualities of care and concern” to guide their communications and actions in response to global warming. However, for the purposes of this research, a focus on the MELD schema has raised sufficient and significant issues to begin a critique on the assumptions and possibilities associated with the exposition and actualisation of active learning processes as transformative praxis.

2.7 CONCLUSION

This chapter has described change as driven by absence, explaining that it is a purposeful, dialectical and reasoned process. The chapter elaborated on how the dialectic, as a ‘pulse of freedom’, requires a combination of a theory of possibility of a eudaimonistic society and totalising depth praxis. In order to understand the relationship between societal structure and agency, the chapter described the evolution of Roy Bhaskar’s transformative model of social activity to a model of four-planar being and its synergies with Margaret Archer’s morphogenetic/stasis cycle. The model of four-planar being with its different levels of being, its geo-historical nature and ideological underpinnings was elaborated. Finally the chapter detailed a number of key features of the four emergent dimensions of the ontological-axiological chain or MELD schema, particularly in the context of environmental learning in South Africa which:

- emerges from a context of poverty and inequality and links to the conative domain of human reason with an interest in desire, lack and need (1M);
- involves an interest in exploring and understanding (scientifically, socially, spatially and temporally) the nature and causes of absences in the cognitive domain of human reason (2E);
- has an explicit change and counter-hegemonic interest, linked to the affective domain of human reason which is responsible for constructing visions for sustainable living that stands up to tests of truth and normative judgements (3L); and
- through the performative domain of human reason, works towards transformative praxis in response to rapidly emerging and ever more complex environmental issues (4D).

These concepts will be referred to in the following two chapters in order to reflect on the particular pedagogical positions reflected in espoused and assumed interpretations of active learning in order to develop an understanding of active learning as transformative praxis in Chapter 3. The ideas will also be employed to reflect on the purpose of learning in Chapter 4. In Chapter 5, the concepts of original critical realism are elaborated upon as they have implications for research in general and the educational research conducted in this study more specifically. In Sections 8.3 and 9.5 the value of using the MELD schema as a tool for analysing active learning processes, is discussed.

CHAPTER 3: ACTIVE LEARNING

3.1 INTRODUCTION

This chapter gives an overview of the form of the active learning framework which was influential in the teacher professional development processes designed for the Schools and Sustainability Course (Section 1.1). The active learning framework is designed as a structure for guiding learning programmes, but due to the under-theorising of active learning in relation to transformative praxis (Section 1.2) can be used in many different ways depending on how its users see its purpose. It is easy to conceive of the active learning framework being used in a behaviorist way that is authoritarian and top-down or instrumentalist. This possibility is backed by previous research in the Schools and Sustainability Course where Hoffmann noted that: “It seems that behaviourist assumptions and intentions can easily be camouflaged within techniques borrowed from popular contemporary theories such as the active learning framework” (2005: 128). This implies that the active learning framework, as an intended Power1 tool, could ironically or paradoxically be re-interpreted to endorse Power2 relationships (Section 2.5) such as mandated litter clean-ups or other regimented activities in schools. This observation highlights a need for examining South African and international interpretations of the concept of active learning.

In order to clarify and critique espoused intentions and assumptions associated with this framework and to argue for its interpretation in a way that is supportive of transformative praxis, this chapter comments on how environmental education discourse in South Africa has influenced the interpretation of the framework, and how the implementation of the framework in the national NEEP-GET and Eco-Schools programmes has been influenced by different strategies employed by these programmes and their agents. Next, the chapter reflects on international environmental education discourse relevant to an emerging interpretation of active learning in the South African context that is open-ended, situated, deliberative and co-engaged, and action-oriented. A consistency between these features of active learning and the transformative praxis interests of critical realism and specifically dialectical critical realism, as described in the previous chapter, will be noted as these features of active learning are elaborated.

3.2 OVERVIEW OF THE ACTIVE LEARNING FRAMEWORK

This section provides an overview of the structure of the active learning framework as proposed by O'Donoghue (2001: 8) (see Figure 3.1 below).

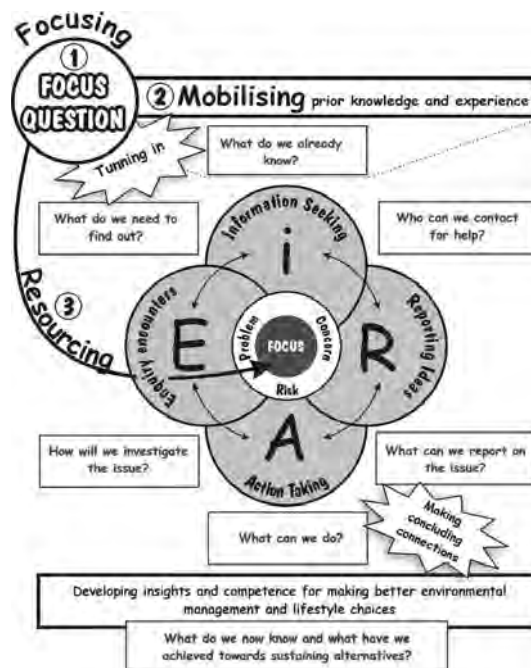


Figure 3.1 Active learning framework (O'Donoghue, 2001)

O'Donoghue's open process framework suggests the identification of an environmental focus (which may be a problem, concern or risk) and then draws attention to four different types of activities that can be used to structure environmental learning programmes around this focus. These are listed below and elaborated through my own understanding and experience with using them in the Schools and Sustainability Course:

- **Information seeking activities:** During which learners find out what is already known about the environmental focus (by learners themselves, their peers, relatives and neighbours). They identify what else they need to find out (know) and find that information (with help from the teacher) through the use of information resources and 'expert' knowledge from institutions and individuals in the local community. Amongst other possibilities, types of information might include foundational environmental knowledge of ecological principles and systems, scientific (natural science or social science) information about an issue or practice, a technological design to support a particular practice, or information on an ethical standpoint on a particular issue.
- **Enquiry encounters:** During which learners investigate the focus further through establishing (through studies such as interviews, audits, surveys, observations, and field studies) how the environmental issue, risk or concern is being experienced in their community through undertaking "investigations in local surroundings" (O'Donoghue, 2001: 7). "This enables learners to monitor, analyse, and evaluate [a] situation, resource or activity, and then plan to take appropriate action" (Schudel, Hoffmann, Wigley, & Conde, 2008c: 2).

- **Action taking:** During which learners act to make “a conscious and informed response” to an issue/concern/risk raised in the course or “[try] out ways of doing things differently” (O’Donoghue, Lotz-Sisitka, Asafo-Adjei, Kota, & Hanisi, 2007: 141). Schudel et al.(2008c) explained that action does not necessarily have to be a practical hands-on activity, but can also involve planning for action, or lobbying for authorities to take action.
- **Reporting:** During which learners reflect on the other dimensions of the framework. This dimension brings in opportunities for critical reflection especially around O’Donoghue’s (2001: 10) suggested “steering question” of “What do we now know and what have we achieved towards sustaining alternatives?”(2001: 10).

O’Donoghue (2001: 7) saw his proposed framework as supporting “open-ended processes of active learning” and suggested that educators could take any one of the dimensions as a starting point and superimpose appropriate methods within the different dimensions of the framework to create a “multi-skilled and multi-perspective approach to environmental risks and concerns”.

Another aspect of the open-endedness of this framework is the complex social-ecological nature of environmental issues which requires people to deal with “uncertainty, poorly-defined situations and conflicting, or at least diverging, norms, values, interests, and reality constructions” (Wals & Jickling, 2009: 78) (see also Lotz-Sisitka & Raven, 2001; Lotz-Sisitka and Schudel, 2006). In addition “both environmental and educational issues are context-specific in time and space, and seldom amenable to universal solutions” (Janse van Rensburg & Mhoney, 2000: 47). Given this context a “productive, constructive, creative, critical and open-ended” use of the active learning framework would seem appropriate (NEEP-GET, 2004: 27).

3.3 THE PEDAGOGICAL UNDERPINNINGS OF ACTIVE LEARNING IN SOUTH AFRICAN ENVIRONMENTAL EDUCATION DISCOURSE

O’Donoghue (2001) drew loosely on Fien’s (1993) concepts of education *about*, *through* and *for* the environment to inform the active learning framework. Fien described education *about* the environment as “knowledge about natural systems and processes and the ecological and political factors that influence decisions about how people use the environment” (1993: 15). This concept clearly links with the ‘information’ dimension of the active learning framework. Education *through* the environment has the purpose of adding “reality, relevance and practical experience” to learning (ibid.: 15) and this has links to the experiential nature of the ‘enquiry encounters’ dimension of active learning, the ‘mobilising of prior knowledge’ which is important to the ‘information’ dimension, and the hands-on and minds-on nature of responding to, or taking action in, a real context. Fien (ibid.: 16)

describes education *for* the environment as a “counter-hegemonic process” and as having “an overt agenda of values education and social change”. Possibilities for this counter-hegemonic stance are opened up by O’Donoghue’s (2001: 7) call for “critical action” and for trying out ways of doing things differently (see action taking dimension above), and for making explicit the transformational possibilities embedded in the framework. The following three sections consider the active learning framework in the light of environmental education discourse in South Africa which enables an elaboration of active learning as situated, deliberative and co-engaged, and action-oriented.

3.3.1 Active learning as situated

O’Donoghue indicated that active learning had emerged at a time in South Africa when concern for “local enquiry, problem solving and action learning” were recognised as important pedagogical processes (2007: 150). This was a time when environmental educators were recognising that environmental education was more than simply about transmitting information about problems, or about experiences to raise awareness of the value of nature. Exploring human-environment relationships and alternative practices in the context of learners’ own lives was needed to help them to deal with the everyday reality of environmental risks and concerns (ibid.).

The Eastern Cape Province NEEP-GET project modeled an issues-based approach to environmental learning (NEEP-GET, 2005a: 14). This was instituted within a broader action-research approach to learning and distinguished from a “thematic approach” to learning in that environmental learning was instigated primarily through a focus on issues and risks identified in photographs of local context and newspaper articles (NEEP-GET, 2005b: 17).

Attempts to support situated learning in South African schools involved the development of environmental policies in schools. At a national level, WESSA was particularly influential in this field, through their distribution and promotion of a School Environmental Policy Pack in the 1990s and early 2000s (Rosenberg, 2009). At a later stage, school environmental policies became integrated into the WESSA Eco-Schools programme, a national programme that is part of the international Foundation for Environmental Education Eco-Schools programme. School environmental policies in this programme were designed to guide the focus within set environmental learning themes or foci in curriculum planning and school environmental project work. For example, the Eco-Schools toolkit required schools to deal accumulatively (in any order) with five themes: nature and biodiversity, resource use, culture and heritage, healthy living, and local and global issues (Eco-Schools Programme South Africa, 2009). In this way, the Eco-Schools approach can be said to be an iterative process of issues-based (through identifying issues, risks, visions and challenges in the school environmental policy) and theme-based (because of the five guiding themes) learning; integrated with

national curriculum requirements for active learning and environmental foci in Curriculum 2005 and the RNCS (Section 1.3).

3.3.2 Active learning as action-oriented

Further historical positioning can also provide clarifications as to how the notion of ‘active’ in active learning has been taken up in South Africa and in the Schools and Sustainability Course. Janse van Rensburg (2000) noted that active learning is often associated with activity-based learning which grew out of Jean Piaget’s observations that young children develop new understandings through active manipulation of objects. She explained how activity-based teaching (along with learner-centred education and cooperative learning) developed as a response to the authoritarian pedagogy associated with apartheid in South Africa in which rote learning dominated and learners were seen as passive receptors of knowledge.

It is useful, though, to make a distinction between active learning in the Piagetian sense of learners “actively constructing their own development, through their interactions with the environment” (Capel, Leask, & Turner, 1995: 219) and activity-based learning in which the cognitive meaning-making process can easily be sidelined through an over-emphasis on hands-on practical action. Rosenberg, O’Donoghue and Olvitt (2010) drew attention to this possibility of sidelining meaning-making when noting that those involved in projects and practical actions (methods under the banner of ‘learning-by-doing’) may be so absorbed in the practical activity that they neglect to reflect on what they are learning. This point is also made by Vinjevoold and Taylor in their concern that:

Learning must involve cognitive and affective activity and not merely movement and speech. Thus ... if not carefully structured and guided by the teacher, [educational activity] succeeds only in passing the time without engaging the cognitive faculties of participants, and thus results in little or no learning. (1999: 65)

In essence the distinction being made here is between hands-on/minds-on learning as opposed to simply hands-on learning.

The South African Eco-Schools Programme explicitly proposed active learning as an important approach to environmental education and drew on a later version of the 2001 O’Donoghue framework in its 2010 programme document (Eco-Schools Programme South Africa, 2010). The programme’s goal implies both ‘hands-on’ and ‘minds-on’ learning because of its emphasis on both “improving environmental management in the school, as well as environmental learning” (Eco-Schools Programme South Africa, 2009: 1) and an emphasis on “learning in relation to action, and the need for sustained environmental education processes in schools, as opposed to once-off awareness initiatives” (Rosenberg, 2009: v). The Schools and Sustainability Course has also emphasised these two aspects

of environmental management and learning through a focus on lesson planning linked to environmental projects in the schools (Section 6.2).

An action orientation to active learning is illustrated by the example of a case study of a South African environmental education centre (Delta Environmental Centre) which was involved in the NEEP-GET programme and in researching the use of the O'Donoghue active learning framework in its teacher professional development projects. Research revealed that ideological drivers evident in the case study arose from:

The pedagogical discourses emanating from the environmental education community, especially the discourse of using the curriculum as a vehicle for change in the school environment, which can be described as a form of social change. This driver for social change in school /local environments manifests as a practice-based discourse strongly focused on local, real issues. (Ramsarup, 2005: 86)

An important historical influence on the notion of active learning in South Africa has been the action competence approach – a concept originating amongst Danish authors working in the health sector and introduced to South African educators through Danish involvement in national environmental education programmes such as the Learning for Sustainability Project and the NEEP-GET in the late 1990s (Janse van Rensburg, 2000; O'Donoghue, 2007). O'Donoghue (ibid.) explained how this approach emerged as a response to instrumentalist designs of early conservation communication/extension programmes. This approach has the same deliberative, co-engagement properties as those described above and is described by Jensen and Schnack (1997) as a democratic response to individualisation in education, necessary because environmental problems are not only solved by decisions made by individuals but by addressing systemic structures of society. Jensen and Schnack (1997: 165) describe competence as “being able, and willing, to be a qualified participant” and describe action as distinct from activity in that action is “conscious, considered and targeted” at an environmental issue. Schudel et al. drew on this distinction to explain that:

Action-taking differs from activity in that it involves a conscious and informed response to an issue, problem or something that has been learned. Environmental ‘action’ moves us towards environmental improvement and an improved quality of life ... An activity, on the other hand, is simply a task done for the sake of doing or learning something. (2008c: 8)

Jensen and Schnack (1997) also distinguish between direct actions which contribute directly to solving environmental problems, and indirect actions which seek to influence others to contribute to solving the problems.

As indicated above, an action competence approach is consistent with education *for* the environment as described by Fien (1993), and is illustrative of the transformative intent behind the active learning framework. The Eco-Schools programme's influence on this dimension of environmental learning can

be found in its support for “projects addressing poverty, unemployment, over-consumption, health risks and ignorance” and its commitment to “tackle environmental issues” (Rosenberg, 2009: v).

Another one of the Eco-Schools initiatives – the development of an Eco-Code as part of the broader environmental policy process also supports education *for* the environment through its focus on value questions. A third link with education *for* the environment in the Eco-Schools programme is its call for involvement of community members to improve school-community links.

This research will explore how notions of action and education *for* the environment can be elaborated in the same way that an ideologically driven Hegelian dialectic has been elaborated through the notion of transformative praxis which describes transformative agency (4D), that is practically grounded in possibility (1M), negatively targeted at absencing absences (2E) and which incorporates value-based ethical reflection on totality (3L) (Section 2.6). Action will also be analysed in terms of Bhaskar’s (1993) description of unity of theory and practice *in practice* at 4D (Section 2.6.4), for example, an indirect action comprising a letter presented to a municipal official or school principal can be analysed for its grounding in real possibility, reasoned judgement and judgements of value, and the possibilities it presents for activism in practice.

3.3.3 Active learning as deliberative and co-engaged

The minds-on nature of active learning discussed above ushers in the notion of this approach to learning being deliberative as well. O’Donoghue described the broadening of environmental learning processes from a narrow focus on communicating environmental ‘messages’ and raising awareness about environmental problems; to a process of “deliberative co-engagement in the challenges and risks of the day” (O’Donoghue, 2007: 148). While the concept of ‘deliberative co-engagement’ is not made explicit in the early developments of the active learning framework, deliberation is implied through the series of ‘steering questions’ in Figure 3.1:

- What do we already know?
- What do we need to find out?
- Who can we go to for help?
- How will we investigate the issue?
- What can we do?
- What can we report on the issue?

The first three steering questions clearly have a dependence on foundational knowledge which can be either prior knowledge (what do we already know?) or new knowledge (what do we need to find out

and who can we go to for help?). A focus on such questions in environmental learning processes was evident in the requirement for “knowledge and understanding of local environmental issues and risks” as one of the key competencies for teacher education highlighted by the NEEP-GET (Lotz-Sisitka & Raven, 2001: 57) and the need to “support teachers in developing perspectives and insights into the themes that they intended to explore” (Raven et al., 2005: 27). Fien’s reference to education *about* environment is clearly an objective here.

The notion of co-engagement is implicit through a focus on ‘sharing’, ‘reporting’ and ‘mediation’ (O’Donoghue, 2001). Such co-engagement was particularly supported through another Eco-School process in South Africa which was the development of an eco-committee in schools which encouraged “community involvement” and “whole school development and democratic management”. Eco-committee members were involved in whole school audits at the beginning of each year, and reviews at the end of a co-engaged policy development and implementation process (Rosenberg, 2009: 22). Whole school development “integrates the formal curriculum, social/organisational aspects, institutional practices, evaluation and community links” (Shallcross & Wals, 2004: 1). In South Africa whole school development was linked to Whole School Evaluation which was one aspect of the Department of Education’s Integrated Quality Management System (South Africa. Department of Education, 2002a).

Significant to the discussion on co-engagement is a brief reflection on the ‘politics of participation’. Reflecting on professional development practices in the NEEP-GET programme, Lotz-Sisitka and O’Donoghue argued that, in South Africa (at the time), “current patterns of practice in participatory education favour individualized meaning-making approaches that are disembedded from the realities of everyday life” (2008: 124) and so become “increasingly tenuous and self-referential” (ibid.: 111). This, they argued was a result of pedagogical processes prevalent in the programme such as “cooperative activity, solidarity, and apparent movement [which] have created an illusion of change” (ibid.: 112). Their critique and subsequent argument for the “foregrounding of situated culture and engagement in socio-ecological context” (ibid.: 123) highlighted the importance of co-engaged processes being grounded and ‘situated’ as described in Section 3.3.1. Situated learning, as described here, has resonances with critical realism’s concern with the ontological primacy of being at 1M and the concern with totality and the place of change in the holistic whole at 3E (see Sections 2.6.1 and 2.6.3 respectively). Also significant in the discussion on participation and co-engagement is a reflection on democratic processes. Wals and Jickling (2009: 80) make a distinction between ‘shallow’ democracy which is “superficial, obligatory, detached, cosmetic, and strategic” while ‘deep’ democracy is “real, intrinsic, involved, genuine, and meaningful”. Wals argues for co-creation and co-ownership of “contextual solutions” with the understanding that “forcing consensus on how people should live their lives is undesirable from a deep democracy perspective” (2007a: 43).

Concerns for situated (linked to everyday reality) and co-engaged processes are also evident in Janse van Rensburg's (in Lotz-Sisitka and Raven, 2001: 30) *Guidelines for Learning Area Working Groups* produced for the NEEP-GET to guide development of the RNCS. Here she called for "active learning, critical thinking, involvement in real issues and encounters in the learners' immediate environment". This call was aligned with the White Paper on Education and Training principle as mentioned in Section 1.3.

3.4 POSITIONING THE ACTIVE LEARNING FRAMEWORK IN RELATION TO INTERNATIONAL AND REGIONAL PERSPECTIVES ON ENVIRONMENTAL LEARNING

Resonances of the active learning framework within international literature are explored in this section. These relate to the open-ended, situated, action oriented, and deliberative and co-engaged aspects of the framework as described in Section 3.3 above. This shows that an interest in active learning as transformative praxis is not only favoured in South Africa, but is more universally characteristic of environmental learning processes that have emerged in response to the global environmental crisis (Lotz-Sisitka, 2004). At issue in this study is a deeper theorising and understanding of such transformative praxis.

A situated approach to active learning resonates with the concept of place-based learning. Smith (in press) illustrated how place-based learning enabled learners to report on issues in their local communities, to become knowledge producers rather than consumers, have the chance to exercise their voices beyond the classroom, and to draw on local communities to extend their knowledge base. Smith (ibid.) argued that, in place-based education, children's everyday experiences become one of the foundations upon which learning is constructed and thus children understand more easily what is being taught. Uzzell (1999: 404) added to this with a call for "authentic learning" which provides a foundation for a better understanding of the relationships between the school and its community (with its enabling and constraining structures) so that actions developed in school are not "surrogate or fantasy actions" but authentic and close to the reality learners might find themselves in after school. This is supported by Taylor's explanation that "the two-way relationship between everyday and school knowledge provides important pedagogical tools for inducting learners into the art of formal discourse, and for the practical application of formal knowledge to problems in the real world" (Taylor, 1999: 113). A "practices turn" (Taylor, 2009) in environmental education provides a pedagogical approach that appears to support learning in the 'real world'. This approach is captured by O'Donoghue (2007: 153) who called for interactions that reflect "practice-based deliberations that

might allow the better mediation of choices that are more reality congruent and socially responsible”. This standpoint highlights the importance of starting from practice so when “constructing models of alternative ways of living” this will be on the “basis of some assumed set of resources” (Bhaskar, 1993, Section 2.6.3). While reflecting on models of production and consumption, Frank (2010: 109) added to the idea that working from where people are situated can strengthen opportunity for transformative praxis. This is evident in the following statement:

People are capable of acting on information and narratives and bringing their own experience and meaning to bear ... This more accurately reflects the ‘messiness’ of cultural meaning-making and everyday life; and it also seems to give more hope for the possibility of corrective action and change.

Also, resonating with a reaction against shallow democracy as discussed in Section 3.3.2 (Wals & Jickling, 2009), the practices turn implies a reaction against actions being driven by ‘outside’ concerns; that is an imposed, decontextualised, ‘outsider’ view of what we should do.

A practices turn is not intended to imply we should ‘leap-before-we-look’ (working from ‘doing’ rather than awareness or information), as this would set us up to make choices that miss out on important 2E reflections on absence and absencing and 3L reflections on totality. In their *Handprint: Action Towards Sustainability* series, O’Donoghue and Fox (2009) illustrated an iterative relationship between knowledge and practice through the use of case studies of local learning (knowledge construction in communities of practice) and change (trying out of sustainability practices) in real contexts. This allowed them to develop this series of resources books “around locally relevant knowledge resources and practical learning activities” (ibid.: 1) which are situated in the context of global environmental change, thus reflecting consideration of 3L totality. For example, one of the books on carbon sequestration supported the planting of an indigenous carbon rich succulent – ‘spekboom’ – thus enabling the regeneration of indigenous biomes at a local level and responding to the global climate change concern.

The emphasis on ‘locally relevant knowledge resources’ as discussed above also needs careful consideration. Taylor warned of a naïve application of the emphasis on local knowledge in the hands of a teacher without strong conceptual frames, where “school knowledge is totally submerged in an unorganized confusion of contrived realism” (Taylor, 1999: 121). Lotz-Sisitka added that epistemological access to knowledge represented in abstract form can be constrained “if sophisticated approaches to mediating between the abstract and concrete, or situated activity and subject matter concepts are not practised” (Lotz-Sisitka, 2009: 65). Response to this concern is evident in the *Handprint* series described above which emphasises working with the national curriculum “within the perspective that each learning area brings to environment and sustainability concerns” (O’Donoghue & Fox, 2009: 1).

Thus situated learning should also steer clear of a ‘local conservatism’ where knowledge is confined to local knowledge without developing new knowledge; and where the emphasis is on learning about, and limiting knowledge to, the local, rather than learning the critical thinking skill of relating local context to national and global contexts (Lotz, 1999).

Another important question in considering situated learning emerges from a social constructionist view of the world as presented by educators such as Lave and Vygotsky whose work emphasises “processes, rather than structures: the focus of enquiry moves from the nature of *things*, towards the ways in which certain phenomena or forms of knowledge come about” (Janse van Rensburg, 2000: 13, original emphasis). This interest has resonance with the processual emphasis of 2E in the MELD Schema as central to the notion of ‘becoming’ (Norrie, 2010 – Section 2.6.2). However critical realism reminds us that an interest in ‘the nature of things’ is still relevant for reflexive practice, for example an interest in both ‘product’ and ‘process’ is evident in Bhaskar’s description of persons as “as intra-active processes-in-laminated products-in-pre-existing/ongoing processes” (Bhaskar, 1993: 276 – Section 4.2.1). With such a view of the person, situated learning should underpin an interest in ‘process’ with an interest in persons as laminated ‘products’ as presented by Danermark’s laminar conception of disability (2006, in Brown, 2009 – Section 2.6.1). An interest in ‘product’ and ‘process’ is also evident in the critical realist interest in “absence as product” as well as “absence as process” (Section 2.3), thus illustrating the importance of focusing situated learning on products and processes that ‘are’, as well as products and processes that ‘are not’.

Hence we see the significance of: A stratified (1M) depth understanding of ‘local’ that is deepened through abstractions regarding social-ecological mechanisms and structures for example; an understanding of absence as process (2E) in local contexts that is deepened through abstract reasoning using the tools of science and social science; and consideration of alternative practices by relating local concerns to the holistic whole (3L). In this sense, teaching children to save water at school through active learning would mean very little without broader knowledge of the (abstract) structures and conditions that influence the way we use water (1M); (abstract) social and scientific understanding of how much we do indeed use and/or waste water – presented, for example, in the form of narratives or graphs of water wastage in the school, and related to abstract constructions (for example graphs or narratives) of water use across different sectors in society, access amongst different sectors of society, and/or water scarcity in the country (2E); an understanding of alternative (ontologically grounded) possibilities in the light of local and national realities and absences (such as water-wise indigenous gardening²⁰ in a water-scarce country with five internationally recognised

²⁰ Water-wise gardening emphasises the planting of indigenous plants that are adapted to the rainfall of the region and uses techniques such as mulching to conserve water.

biodiversity hot spots²¹) (3L); and finally, the trailing of the proposed response through an action such as starting a small indigenous garden drawing on knowledge of appropriate plants, their uses and care (4D).

The ‘action’ element of the active learning framework and support for sustainability projects in the Schools and Sustainability Course, was seen as a way of providing a context for learning and critical and practical engagement with sustainability issues. The concept of ‘sustainability’ is deeply entrenched in international educational discourse associated with environmental concerns, as is evident in the establishment of the United Nations Decade of Education for Sustainable Development and ongoing international efforts to implement actions in support of this decade (UNESCO, 2009).

While Jickling and Spork have reservations about the determinism implied in the preposition ‘for’, they acknowledge the importance of the counter hegemonic (Fien, 1993 – Section 3.3) or socially critical dimension of environmental learning:

It is important to recognise that activities labelled 'education for the environment' have helped to place, and keep, the political dimension of issues on the environmental education agenda. As thinking about the term has developed, the socially critical dimension of environmental education has been illuminated and has thus helped to give life to this field in the face of conservative influences. (Jickling & Spork, 1998: 323)

With this quote, the transformative agenda of environmental learning is highlighted. However, Jickling and Spork argue that: “If we are serious about education, we should, in the first place, put aside our most promising visions for the future. Moreover, if we really want to open students' minds to alternative world views, it makes little sense to steer them, however gently, towards a particular vision” (Jickling & Spork, 1998: 324). This highlights the importance of transformation not being imposed by an outsider or presented as a pre-determined doctrine, thus “militating against the evolutionary tendencies of environmental thought” (ibid.: 323). These concerns have resonance with Norrie’s (2010) description of the imposed rational order of the Hegelian dialectic (Section 2.6.3).

Another potential problem with the concept of Education for Sustainable Development is that of Utopianist or reified applications of the concept (Jickling, 1992; Lotz-Sisitka, 2008), where there is a failure to ground ideas in real possibility, reasoned judgement and judgements of value. Instead there is a need to examine the shaping influences and practical adequacy of normative frameworks (as highlighted by Lotz-Sisitka & Schudel, 2006 – see below), thus enabling a concrete Utopianism as

²¹These hot spots include the Succulent Karoo and Cape Floristic Region hot spots in the Western and Eastern Cape and the Maputoland-Pondoland-Albany hot spot in the Eastern Cape and KwaZulu-Natal (Conservation International, 2007).

envisaged by Bhaskar (Section 2.6.3). Drawing on the concept of concrete Utopianism, Frank (2010: 111) argued that this concept “lets us imagine new social possibilities and organizationally cooperative models of being. We can look at the vast resources we have and imagine how they could best be used to better human life and end suffering”.

The situated and constructed nature of learning can be further elaborated through a critical realist ontology. ‘Strong constructivism’ can lead to a relativist ‘anything goes’ outcome in environmental deliberations. Price explained that this “leads to the inability to act, since how can we act if we cannot choose between better or worse” (2007: 107)? For example, the concept of sustainability is also open to relativist interpretations leading to an “ambiguity that, somewhat paradoxically, provides the focus for discourse about a variety of issues within the contemporary problematique, while undeniably also providing fuel for those who would procrastinate in their resolve to seek sustainability” (Bawden, 2004: 21). Lotz-Sisitka (2008: 142) suggested that by probing “deeper, more complex and reality congruent understandings” of sustainability issues, we can construct visions and interpretations of sustainability in particular contexts that do not leave us with a sense of ‘no direction’ cultivated by the relativism of strongly constructivist notions of learning. Instead we can conceive of a weak (non-relativist) constructivism as suggested by Lotz-Sisitka (2008; see also Brown, 2009) in which views of reality can be constructed in the minds of learners, but remain open to critique and need to stand up to tests of truth and normative judgements. Nor are we left with a contextually inappropriate vision of a sustainability practice as might be prescribed in an objectivist (transmission) approach to learning which promotes a “conception that knowledge is external to the knower and learning is representing that reality” (Brown, 2009: 8). Such an approach would be critiqued by Bhaskar for representing an epistemic fallacy (1993, Section 2.6).

In response to concern regarding the epistemic fallacy, Bhaskar calls for referential detachment as described in Section 2.1. By highlighting the detachment of the referent from the reference (social referential act) (Hartwig, 2007), we can distinguish between an intransitive (relating to the referent) and transitive (relating to the reference and the social act of knowledge creation) dimension of reality. This allows us to “see how changing knowledge of unchanging objects is possible” (Bhaskar, 1979: 11) and to mediate between an ontologically grounded ‘being in the world’ and an epistemologically grounded ‘knowing the world’ through particular learning processes. This relates to Section 3.3.2 above, where situated learning was linked to a hand-on/minds-on view of learning. This concern can be linked to the work of Lev Vygotsky whose work was described as “a bridge that connects the human organism to its medium, the mind to the body [breaching] the frontiers established by Cartesian thought” (Del Rio & Alvarez, 2007: 282). This also has resonance with Bhaskar’s call for the unity of theory and practice as discussed in Section 2.6.3.

Of course normative judgements are themselves constructed so that we are called to examine the shaping influences and practical adequacy of prescribed normative frameworks –as suggested by Bhaskar’s statements on judgmental rationality, and as illustrated in research conducted by Lotz-Sisitka & Schudel (2006). They drew on Sayer’s concern that normative arguments pose the danger of “empty moralizing [and] of assuming that whatever is agreed to be good, will therefore come into being” (Sayer, 2000: 178). Sayer argued that a critical realist argument would need to:

Think about the feasibility of desirable alternatives in terms of how the recommended social processes would work, asking counterfactual questions, conducting thought experiments and scrutinising critical standpoints. (ibid.: 178)

When considering actions within the active learning framework, we also need to emphasise that while it is educationally sound to involve learners as “active participants in ongoing decision-making processes in their communities”, the role of education as conceived within a liberal approach to education is not to solve community problems (Jensen & Schnack, 1997; Wals & Jickling, 2009: 79).

This argument is made explicit by the following argument:

First, it is not and cannot be the task of the school to solve the political problems of society. Its task is not to improve the world with the help of the pupils’ activities. These activities must be evaluated on the basis of their educational value and thus according to educational criteria. A school does not become ‘green’ by conserving energy, collecting batteries or sorting waste. The crucial factor must be what the students learn from participating in such activities, or from deciding something else. (Jensen & Schnack, 1997: 165)

This is backed by Mogensen and Mayer (2005: 19) who said that “actions must first and foremost be seen in relation to their educational and/or epistemological value – not in the first hand in relation to any possible societal and material consequences of the activity”. This argument is also evident in the words of Jickling who argued that:

For many practitioners, educational achievement should enable individuals to act intelligently and with some measure of independent thinking. People will not think and act intelligently if they have been trained, conditioned, coerced, or otherwise manipulated to behave in a certain way. (Jickling, 1997: 95)

These arguments are not saying that learners should not be involved in environmental action, but they are questioning the purpose and motivation behind environmental action. In other words environmental learning should focus on “human development rather than human behaviour” (Wals & Jickling, 2009: 78).

Seeing learners as decision-makers in community concerns links to O’Donoghue’s reference to deliberative, co-engaged processes central to active learning (see Section 3.3). Such processes can be better understood through considering their origins in a social constructivist epistemology which underpin a current trend in environmental education of ‘social learning’. Wals described social

learning as “learning by mirroring one’s own ideas, views, values and perspectives with those of others” (Wals, 2009: 385). It is a process whereby people “recognize, evaluate and, when needed, potentially transcend or break with existing social norms, group thinking and personal biases” (Wals, 2007b: 39). Wals highlighted the possibility for “dissonance created by introducing new knowledge, alternative values and ways of looking at the world [to] become a stimulating force for learning, creativity and change” (ibid.: 39). Another way of emphasising the transformational intent of social learning is “a shift or switch to a new way of being and seeing” (Wals, 2009: 385). Bhaskar’s elaboration on concrete Utopianism – “thinking about how a situation of the world could be otherwise, with a change in the use of a given set of resources or with a different way of acting subject to certain constraints” (Bhaskar, 1993: 22 – Section 2.6.3) – helps us to think about how these shifts might happen. As with education *for* the environment, an explicit transformational intent is being elaborated here, but within a different dialectical conception.

Another discussion pertinent to the deliberative nature of the active learning framework is a consideration of environmental learning as a ‘problem-solving’ activity (as introduced in Section 3.3.3). This means acknowledging and teaching learners to deal with controversial issues through:

... enabling students to understand arguments, identify assumptions, open their minds to alternative world views, engage them in cultural criticisms, and examine ideologies which underlie human-environment relationships. (Robottom & Kyburz-Graber, 2000: 113)

A document representing the international environmental education community – the Bonn Declaration – calls for “creative and critical approaches, long-term thinking, innovation and empowerment for dealing with uncertainty, and for solving complex problems” (UNESCO, 2009: 2). The emphasis on creativity and new ways of thinking is important for environmental learning processes with a transformative intent, for example, Orr spoke of a sustainability revolution characterized by “the emergence of new ways to think about the human role in nature that stretch our perspective to whole systems and out to the far horizon of imagination” (Orr, 2005: v). However, Smyth (1995) raises a concern that the complexity of the issues often results in oversimplification of, and hasty judgements about, environmental issues; thus resulting in solutions reflecting idealistic Hegelian responses to negativity where education results in identifying “real contradictions in the world” with no realistic way to resolve them (Norrie, 2010: 60 – Section 2.6).

In dealing with the complexity highlighted by Smyth, Wals calls for a “systemic and reflexive way of thinking and acting with the realisation that our world is one of continuous change and ever-present uncertainty” (2007a: 37) and highlights that “a learning system has to be reflexive in order to be willing and able to question (and break away from) existing routines, norms, values and interests” (ibid.: 38). Bhaskar’s alternative to the Hegelian dialectic offers an approach to the transformational

intent in reflexive environmental learning processes when “crisis tendencies” are highlighted (Bhaskar, 1993: 163 – Section 2.2) where, instead of trapping learners between two opposing concepts, active learning can help learners to identify the difference between what ‘is’ and what ‘can be’, thus fueling realistic and ontologically grounded change. An understanding of absence at 1M can guide us in understanding issues and risks and directing our problem-solving activities more carefully. For example, a knee-jerk problem-solving reaction to deforestation would be ‘stop cutting down trees’ and ‘plant more trees’. However, by understanding poverty and lack of services in rural areas (1M) and the need for people in rural areas to cut down trees for fuel (2E), in the light of human rights and social justice arguments for basic needs and the needs of a functioning ecosystem (3L), we can consider absencing (or at least reducing) this problem by trialing the use of ‘hot boxes’²² in the community (4D), in addition to planting trees.

In line with the knowledge that crisis tendencies will manifest in environmental learning processes, Stevenson (2006: 283) is wary to rule out problem-solving per se as a valuable pedagogical approach and highlights the potential for problem-solving for “developing flexible understanding and skills for lifelong learning about complex issues”. He suggests that fewer, less complex, local environmental problems or issues that connect to learners’ lives need to be studied in-depth and intensively (Stevenson, 2006; see also Schudel, 2010). Also important is for problem-solving to be considered as context-dependent as was highlighted at the first international governmental conference on environmental learning held in 1977 in Tbilisi (Russia) where a call was made to “involve the individual in an active problem-solving process within the context of specific realities” (UNESCO, 1977: 24). Context-sensitivity is also an important consideration in Bhaskar’s dialectic as highlighted by Hartwig (2007 – see Section 2.6.4).

Another potential limitation of problem-solving is that it tends to represent a negative rather than positive or healthy state as the norm (Smyth, 1995). In environmental education hasty judgements arise out of an approach based on fear-mongering – a tendency to perpetuate fear and anxiety in an effort to drive environmental change (Lotz-Sisitka, 2011) with resultant ‘knee-jerk’ reactions. An alternative approach is suggested by the open-endedness of O’Donoghue’s framework, which highlights that the starting point within the four dimensions of information, enquiry, action and reporting need not be with information about a problem or enquiry into a problem. If one starts with a small, manageable action linked to a sustainability practice already in process in the school or community, then this might also be a way of containing the magnitude and complexity of the issues addressed, while recognising them as part of the ‘holistic whole’. For example, activities initiated by

²² A hot box is an insulated container used to reduce fuel used in cooking. It is particularly useful for reducing fuel used to cook staple foods such as rice or maize meal.

O'Donoghue (2011) in the Environmental Learning Research Centre, suggest possibilities for starting with an **action** of making sour dough bread, followed with **information** about how the souring processes breaks down gluten (thus addressing the problem of gluten allergies), followed by an **enquiry** regarding the ingredients, costs and taste in homemade versus shop bought bread, and **reporting** on the differences between the two types of bread.

Wals illustrated how a number of foundational skills needed for deliberation and co-engagement could be developed through problem-solving involving “the integration of multiple perspectives, the co-designing of viable alternatives, the utilization of diversity, and the simultaneous development of a whole range of sustainability related competences” (2009: 385). This trend towards deliberating alternatives is increasingly characterising environmental education in South Africa and is supported by resources such as the Handprint series discussed above and a book on sustainable technologies (O'Donoghue & Peddie, 2011). This work, exploring practical hands-on activities, is reflective of Bhaskar's interest in transformative praxis involving “active and reflexive engagement within the world in which we seek to achieve the unity of theory and practice in *practice*” (Bhaskar, 1993: 9, emphasis original – Section 2.6.4).

3.5 CONCLUSION

This chapter has presented the active learning framework as an open-ended framework for structuring environmental learning, including activities where learners work with environmental information, conduct enquiries in their local environment, consider appropriate actions towards sustainable living, and reflect critically on the process.

Active learning was elaborated across the national and international context and its resonance with transformative praxis was highlighted in the following ways:

- Active learning, if situated may potentially be practically grounded in real possibility (1M) and explorations of human-environment relationships, within real, relevant and authentic situations, thus enabling an understanding of absence and absencing (2E).
- Active learning, as deliberative, can resonate with the 3L interest in moral reasoning in relation to the holistic whole when learning involves mirroring one's own ideas, views, values and perspectives with those of others” (Wals, 2009: 385 – Section 3.4) and when exploring alternative (ontologically grounded) possibilities in the light of local and national realities and absences.
- Active learning as action oriented may potentially be counter-hegemonic with an interest in change. It can include the investigation of small, manageable, alternative

practices which relate to Bhaskar's interest in the unity of theory and practice in practice (4D); but also indicates (after action competence theory) that in educational contexts, action projects could legitimately be approached with a developmental, rather than behavioural emphasis so that the success of educational activities need not only be judged by the achievement of tangible change.

The next chapter includes detail of literature discussing the broad educational, curriculum, teacher professional development, and social-ecological context from which the active learning processes detailed in this study emerged.

CHAPTER 4: THE CONTEXT OF ACTIVE LEARNING

4.1 INTRODUCTION

Chapter 1 introduced the educational (school and teacher professional development) and social-ecological context of the study. This chapter revisits these important background influences, and discusses them with respect to the main, interrelated objects of the study – active learning and teacher professional development.

The chapter begins (Section 4.2) by discussing broadly defined educational orientations or theories of education, namely positivist/behaviourist, liberal humanist, critical, post-structuralist and relational-processual. The latter orientation is an orientation proposed by Price drawing on the work of a number of socio-cultural and critical realist educational theorists (Vygotsky, 1961, 1978; Lave & Wenger, 1990; Collier, 1994; Plant, 2001; Shipway, 2002; Haraway, 2003; Brown, 2004 and Chapman, 2004 in Price, 2007). Price presents the idea of relationalism as the response to the “[unnecessary] conundrum of relativism versus absolutism” (ibid.: 97); and, using the metaphor of a river, describes things such as societal structures as processual and which can be “seen as ever-changing vortices, ripples, splashes, which have no independent existence as such” (ibid.: 98). This discussion focuses on the underlying assumptions of these different educational theories, with respect to notions of the relationship between education and society; freedom and agency; and ethics, knowledge and truth. These notions have been used to understand the focus of this research more fully; that is, a situated, action-oriented, deliberative and co-engaged approach to active learning as previously discussed in Chapter 3.

The following two sections of the chapter discuss teacher professional development – in South Africa and internationally while reflecting on some of the educational theories or orientations described in Section 4.2. These ideas are related to a situated, action-oriented, deliberative and co-engaged approach to active learning – in Section 4.3 these links are made in a separate sub-section (4.3.5) while in Section 4.4 these links are made within each sub-section.

Section 4.5 reflects on environmental learning in the South African curriculum and how opportunities for a situated, action-oriented, deliberative and co-engaged approach to active learning have persisted or changed from the first post-apartheid curriculum change in 1995, to the RNCS (the curriculum context in which this study took place) to the CAPS curriculum (into which this study is expected to feed). The section is organised into a number of ‘themes’ that have been prevalent amongst environmental educators wanting to work meaningfully within the school curriculum context in South Africa and internationally.

Section 4.6 reflects on active learning in the context of the Foundation Phase, providing perspective on the role of young learners in transformative praxis. The final section of the chapter considers the socio-ecological context of the study in greater depth than introduced in Chapter 1 with reflections on how this might influence opportunities for active learning.

4.2 RELATING EDUCATIONAL ORIENTATIONS TO ACTIVE LEARNING

PROCESSES

This section seeks to distill underlying themes within educational debates, namely the relationship between education, individuals and society; notions of agency and freedom; and the relationship between ethics, knowledge and truth. I have made reference to educational typologies in the section, and while differences in emphasis across typologies have been noted, in the interests of avoiding incommensurable dichotomies that can potentially create a ‘tug-of-war’ between different educational approaches, I have tried to develop a narrative which builds on, and expands the useful and valuable ideas within different approaches. This choice is also informed by a sense that some explanation for failures in the educational system can be attributed to the difficulty of applying ideas in practice, so that if an idea ‘does not work’ in practice, it may not necessarily mean that the idea has no merit, but that it may be either incomplete, have mis-placed emphasis, or that more effective ways of applying the ideas in different contexts might be necessary.

4.2.1 The relationship between education, individuals and society

One of the questions raised in Section 3.4 is whether it is the role of education to solve community problems. Jensen and Schnack (1997), arguing from a political liberal approach to education, see the role of education as preparing learners for democratic participation in society. They argue that education for democracy involves a concern for “liberty, equality and solidarity” and also “socialisation and qualification for the role of being a participant” in society (ibid.: 165). The argument for Jensen and Schnack’s explicit rejection of over-emphasis of solving the problems of society is a reaction against an instrumentalist approach to environmental education where emphasis is placed, for example, on the success of ‘greening’ actions above ‘what is learned’ in the process (Section 3.4). An over-emphasis on environmental action in schools can be related to a positivist or behaviourist approach to education which represents the “modernist ideal of engineering society through education” where “correct” behaviours are recommended by experts (Price, 2007: 24). Such an approach is represented, for example by the work of Hines, Hungerford and Tomera who argued that “it may be more efficacious, in the case of certain environmental problems, to manipulate

situational factors in order to produce desired behavioural changes” (Hines, Hungerford, & Tomera, 1986 in Jickling, 1997: 95).

Within behaviourist processes “practice is reduced to technique” (Jensen and Schnack, 1997: 165). Jensen and Schnack describe such a technicist view of the role of individuals in society as “educational short-circuiting” and argue that actions in the educational context “must be understood and explained with reference to motives and reasons, rather than to mechanisms and causes” (ibid.: 166). While Jensen and Schnack present a view of education where individuals are socialised as *participants in society*, the behaviourist project aims to develop individuals who are socialised as *filling a particular place in society*. The former presents an open-ended view of the individual in an open-ended society which requires a creative and responsive agent; while the latter presents a pre-determined, passive agent in a pre-determined society.

Even in primary school where children need constant reminding/conditioning into certain behaviours dictated by the teacher such as closing taps, washing hands, caring for pets and using litter bins, there is always a place for an educational moment and unexpected results might occur. For example, Mambinja (2008) provided a worksheet for her Grade 1 learners where they were expected to mark pictures of actions as either ‘good’ or ‘bad’. When it came to assessment she realised that it was not so simple to mark the learners as either ‘right’ or ‘wrong’. This is illustrated by her expectation that learners would mark the picking of flowers as ‘bad’, while many marked this as ‘good’. When she queried the choice, one learner explained that the picture depicted a child picking flowers for Mother’s Day, thus opening opportunities for discussions regarding harvesting and planting and caring for others. This illustrates the complexity of environmental issues (even with an action as simple as picking of flowers) and illustrates how young ones can be engaged at an early age in motivating and reasoning regarding their actions and choices.

The role of an individual as a creative and responsive agent is elucidated in Popkewitz’s (2001) historical review of the relationship between individuals, education and modern society. He contrasts a behaviourist social science at the turn of the [20th] century which “assumed a certain fixed set of relations between identities and institutions” with a contemporary view of individuality which is presumed to be “less stable” in that individuals are expected to be able to respond to varied and unexpected situations in a rapidly changing information and computer age (ibid.: 325). With this contemporary image of individuality, the state requires education to “shape the individual who would master change through the application of rationality and reason” (ibid.: 318). Popkewitz, somewhat critically, describes liberal education ideals where pedagogy is expected to “rescue the child” so that the child can become a self-disciplined, self-motivated adult and “function as a productive participant in the new collective social projects of the day” (Popkewitz, 2001: 313). This, Popkewitz explains,

requires a constructivist view of the teacher or child who is an: “‘empowered’ problem-solving individual capable of responding flexibly to problems that have no clear set of boundaries or singular answers. The teacher is “assumed to possess a pragmatic individuality that is tied to the contingencies of situations in which problems arise” (ibid.: 325, author’s quotation marks). Consideration of this kind of responsive flexibility (or reflexivity) in a world of multiple contingencies is important in the field of environmental education, which is dealing with “uncertainty, poorly-defined situations and conflicting, or at least diverging, norms, values, interests, and reality constructions” (Wals, 2009: 78 – Section 3.2). Wals argues that “a learning system has to be reflexive in order to be willing and able to question (and break away from) existing routines, norms, values and interests” (Wals, 2007a: 38 – Section 3.4). However, this reflexivity needs to be one that does not create a subject “divided against him or herself in so far as the condition of a mature and responsible use of freedom entails a domination of aspects of the self” (Dean, 1999: 156) as might be expected of the individual in the liberal tradition described by Popkewitz above.

The liberal ideal in modern systems of government can be explored through Foucault’s notion of governmentality. Popkewitz draws on Foucault to describe governmentality as “the art of governing in which the tactics of regulating society ... interrelate with the patterns of personal decision-making and ‘reasoning’ through which individuals [judge] their own competence and achievements” (2001: 319). A form of governance underpinned by the notion of governmentality can be enacted in either transformative or oppressive ways. Reflecting on the latter scenario, Popkewitz (2001) explains how radical views of societal reform (developed by Dewey and Vygotsky in the early 1900s) were dwarfed by systems of social administration and institutional change driven by scientific applications of developmental psychology that saw change in terms of changing the individual to fit certain societal norms. This is evident in an educational context in the work of Talcott Parsons who envisaged schools as “socializing institutions designed to provide students with the value and skills necessary for them to function productively in the larger society” (Giroux, 1980: 225). In this way, a liberal approach to education is vulnerable to becoming simply a vehicle for reproduction of the social norm. Dean describes such non-liberal, often ironically oppressive, realisations of governmentality as “authoritarian governmentality ... that seek to operate through obedient rather than free subjects, or, at a minimum, endeavour to neutralize any opposition to authority” (1999: 155). This distinction between obedient and free individuals links to Section 4.2.2 in which a distinction is drawn between oppressive and transformative approaches to liberal education.

But firstly, another problem with assumptions around the proactive role of the individual in society within liberal education systems is discussed. This revolves around a paradox which emerges where liberal democratic approaches to education – emphasising access for all to participate in society at all levels – result instead in a new tyranny of exclusion. Giroux explains how liberal education systems

“privileged a particular Protestant view of individuality that was English-speaking, male, and racially charged” (1980: 324). In this way education ignored the “role that schools played in reproducing the inequities of wealth and power that characterize ... existing society” (ibid.: 324). This can be explained by a liberal government’s presupposition of “certain types of free subject in the operation of particular programmes of conduct” (Dean, 1999: 156). If authorities are conscious of this presupposition then this can lead to the exclusion of certain categories who are deemed by those in authority to be incapable or not ready for participation in democratic processes (for example, children or colonised nations) from the “status of the autonomous and rational person” so that these members of society are either permanently or temporarily dependent on a “good despot” (ibid.: 156 and 158) to dictate appropriate behaviour on their behalf.

If, on the other hand, authorities are not conscious (or choose not to address) problems associated with an assumed ‘free subject’, then this can lead to the exclusion of needs and concerns of certain sectors from consideration in societal structures and processes.

More insight into the reproduction of inequality is offered by Taylor, drawing on Bernstein, to explain that “working class children have a greater distance to travel to acquire the elaborated language codes and specialised principles of classification which structure formal school knowledge” (Taylor, 1999: 112). Middle class children are exposed to particular cultural constructs, forms of reasoning, and resources (for example, through their family lives and access to books, libraries, newspapers, museums, and more) which are the same cultural constructs and forms of reasoning (more flexible, open-ended and abstracted) that are used to structure curricula. Thus, a problematic assumption associated with a liberal mode of education becomes that middle class children are already in a particular ‘frame of mind’ on entering the school system that will give them greater chance of success than a child who has not had the same exposure in early childhood.

Concern that educational inequalities are perpetuated (unintentionally) within liberal modes of education informed the work of the critical pedagogy theorist Giroux. Giroux explains how Bowles and Gintis’s (1976 in Giroux, 1980: 225) correspondence theory of education is used in sociological critiques of education to highlight that the “hierarchically structured pattern of values, norms, and skills that characterise the work force and the dynamics of class interaction under capitalism are mirrored in the social dynamics of the daily classroom encounter”. Drawing on correspondence theory Giroux highlights the importance of examining “normatively based patterns of meaning and structure that give form and content to certain aspects of both the overt and hidden curricula of schooling” (ibid.: 226). Such normative questioning would form an important step in maintaining “an autonomy for the curriculum from the instrumentalism of economic or political demands” (Young, 2008: 34)

and in highlighting a distinction between education as reproduction/replication of status quo or education as transformation.

In the school context, Shipway drew on Corson to propose a response to the social reproduction of inequality:

Instead of implicitly preparing students to replicate social structures without thought as to whether or not they are helpful, a critical realist perspective of education would be cognisant of the way particular 'socio-cultural, political and economic interests' are presented to students through the institutionalized nature of schooling. (Corson, 1995: 301 in Shipway, 2001: 186)

While correspondence theory is useful in pointing out hegemony imposed by dominant powers in society, Giroux also points to some limitations of correspondence theory – namely its failure to “highlight the contradictions and tensions that characterize the workplace and school” – a problem exacerbated by an overly-simplistic superstructure model of reproduction (Giroux, 1980: 227). However, this problem is recognised by those working across liberal and critical traditions, for example Jensen and Schnack (1997: 166) who speak of applying a “liberal educational concept in critical educational theory” and draw on a Danish publication of Schnack’s work (1997 in Jensen and Schnack, 1997: 166, author’s quotation marks) to argue that “‘critical’ in this [liberal/critical] tradition does not, of course, mean ‘to be in opposition’ or ‘negative’ but, on the contrary, to have an interest in analysing underlying structures, conditions and preconditions for the appearance of the phenomena”. This vision of education acknowledges that underlying structures need to be ‘analysed’ not simply identified, implying that there is a complexity needing to be described/revealed. The concern regarding ‘super-structuration’ is mirrored in Archer’s (1995: 222) argument that what is missing from the theory of ‘new sociologists’ such as Basil Bernstein and Bourdieu is a theory of the politics of education which specifies “processes producing educational change and stasis which are structured in different ways in different educational systems”.

Bhaskar’s concept of laminated totality “constituted by several ontologically distinct but interacting mechanisms [and] their relationship of dependency and interdependency” (Bhaskar, 2010: 14 – Section 2.6.3) can enable explanation of teaching and learning in the school and classroom context. Brown applies Bhaskar and Danermark’s (2006, in Brown, 2009) laminar conception of disability as comprising physical, biological, psychological, psycho-social, socio-economic, cultural and normative mechanisms; in an educational setting. Brown provides examples that:

learning is enabled and constrained by the lighting, heat, time of the day, time in the week and spatial layout of the classroom (mechanisms operating at the physical level), by whether the children are hungry or sated, tired or alert, well or unwell (mechanisms operating at the biological level), and by the learner’s motivation, aptitude and confidence (at the psychological level) the group dynamics in a classroom or parental cultural beliefs about education [mechanisms operating at the socio-cultural

level] and ... curriculum issues [mechanisms operating at the normative level]. (2009: 24)

These same levels can also be used to analyse environmental issues as suggested by Lacey and Lacey's reflection on the laminated nature of seeds as:

(a) Biological entities: under appropriate conditions they will grow into mature plants from which (e.g.) grain will be harvested. (b) Constituents of various ecological systems. (c) Entities that have themselves been developed and produced in the course of human practices. (d) Objects of human knowledge and empirical investigation. All these need to be taken into account when investigating risks and the potential of alternatives. (Lacey & Lacey, 2010: 193)

This notion of lamination is included in Bhaskar's concept of the person and central to a relational-processual approach to education (as tentatively defined by Price). This approach can enable teachers to see their students as "(...) persons ... best conceived as intra-active processes-in-laminated products-in-pre-existing/ongoing processes" (Bhaskar, 1993: 276 in Price, 2007). In order to understand the complexities of this notion of the 'person', we can consider the complexities of 'consumer choice' firstly in relation to '**pre-existing/ongoing processes**'. These are constituted by generative structures and mechanisms (Section 2.4) such as trade and market regulations, environmental regulations associated with particular products, initiatives such as the 'fair trade' movement (United Nations Environment Programme, 2007) and ongoing ecological processes with their associated "*provisioning services* such as food, water, timber, and fibre; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling" (Millennium Ecosystem Assessment, 2005: v). This aspect of a person can be related to Plane [d] – plane of subjectivity of the four-planar social being (Figure 2.3 – Section 2.4).

A second consideration is people's interactions within '**laminated products**' at Plane [c] of the four-planar social being – social interactions (Figure 2.3 – Section 2.4). Continuing the consumer choices example in another elaboration on Bhaskar's (2010: 14 – Section 2.6.3) notion of laminated totality, teachers might consider the **physical** practicalities of what products are available and accessible to the learners. They might also consider the **biological** processes central to the life cycle of the products being consumed and their effect on human (and other animals) and environmental health. Then they might consider the **psychological** and **psycho-social** marketing strategies, and product information (or lack of) regarding personal and environmental health and how these might influence learners' perceptions of needs and wants²³. Further they might consider **social-ecological**²⁴ aspects of consumer

²³ The influence of marketing on needs and wants is highlighted across different grades in the RNCS Economic and Management Sciences curriculum – (South Africa. Department of Education, 2002c) but is noticeably absent in the Foundation Phase in the new CAPS curriculum

choices such as what products are available to whom as well as broader considerations of ecological and socio-economic considerations at different stages in the life-cycle of certain products²⁵. The **cultural** aspect of consumer choices might be considered with respect to nationality, ethnicity or the ‘youth culture’. Finally the **normative** aspects of consumer choices would require learners to think about the values that underpin consumer choices and the relationships between people, societies, and between people other animals. As Plane [c] is linked to 2E in the MELD (Section 2.6.3), at this point learners would be identifying absencing processes within these different laminated levels.

Dialectical contradictions raised here may “induce crisis tendencies which are systemic and/or structural and/or implicate power²⁶ relations and/or effect legitimizing and/or motivating ideologies” (Bhaskar, 1993: 163 – Section 2.2). Here the role of the teacher would be to “mediate between their students and collective constructions of the world where the collective includes humans and non-humans” and where non-humans refer to social and natural objects and structures (2007: 40). This would mean mediating the inter-subjective contradictions that arise at Plane [b] of the four-planar social being (Figure 2.3 – Section 2.4). It would also mean mediating **intra-active** processes as internal relations within a “subject-matter” made up of elements or aspects that are relationally essential and intrinsic (existential constitution), non-essentially contained (intra-permeation) or causally efficacious (intra-connection) (Bhaskar, 1993: 123). Thus, in an environmental education context, a teacher focusing on consumer choices would help learners to think about how they are **existentially constituted** by a need for the consumption of certain essential foods and goods. Then, as proposed in the Grade R²⁷ RNCS Social Sciences curriculum learners would distinguish between “needs and wants” (South Africa. Department of Education, 2002h: 23) through which some foods and goods might be identified as **non-essential**. Then they might try to identify the ‘real’ reasons that are **causally efficacious** on their choices as consumers. This aspect of a person relates to the intra-active considerations at Plane [b] of the four-planar social being described in Section 2.4.

This discussion shows that the relationship between individuals and society can be seen as a complexity of internal relations acting within laminated systems and emerging from underlying generative structures and mechanisms. It also shows, through an example, how education can serve to illuminate these relations and processes. The intra- and inter-subjective relations explored in this

²⁴ Bhaskar and Danermark’s ‘socio-economic’ has been adapted here to reflect an ‘environmental’ component as elaborated in Section 1.6.

²⁵ Such as with the RNCS Economic and Management Sciences interest in “the efficient and effective use of different types of private, public or collective resources in satisfying people’s needs and wants, while reflecting critically on the impact of resource exploitation on the environment and on people” (South Africa. Department of Education, 2002c: 4).

²⁶ Power2 relations are described by Bhaskar as oppressive power relations. Section 2.5 elaborates on the notion and differentiates these from Power1 relations whose characteristics entail the possibility of human emancipation

²⁷ Grade R is the first formal year of schooling before Grade 1 in South Africa.

example illustrate the ethical questions raised at Plane [b] of four-planar social being. The question of ethics is taken further in Section 4.2.3. But first the question of agency (intrinsic to the action-oriented ‘material transactions with nature’ at Plane [a] of four-planar social being) is addressed in the following section.

4.2.2 Freedom and agency

The above discussion on education, society and the individual focused on how liberal approaches to education can serve to reproduce society and privilege some individuals or groups above others, and in so doing, perpetuate the status quo. However, history tells us that society **is** constantly evolving and so it becomes necessary to develop an understanding of society and education in society that can explain how change happens and how education might play a role in that change. Reflecting on a less authoritarian, and more transformative notion of governmentality, Ferreira emphasises that “liberal modes do not seek to rule in a repressive fashion but rather to find more caring, pastoral and effective [Power1] ways of governing through the ‘freedom’ of the subjects they govern” (2007: 33, author's quotation marks). This view of governmentality introduces the first important concept discussed in this section – namely ‘freedom’. Applying Bhaskar’s (1993 – Section 2.5) notions of power to this interest, freedom would mean identifying oppressive Power2 social structures and enabling emancipatory (Power1) relations in a way that challenges oppressive Power2 relations.

Giroux (1980) highlights another problem with correspondence theory (beyond its limitations with respect to understanding the complexity of the structures that govern society discussed in Section 4.2.1) in that it deterministically ignores the power of agency, focusing on the form and content of a reproductive education system without emphasising the process which results in reproduction:

In its attempt to contextualise schooling in a reproductive thesis [correspondence theory] practically seals off the possibility for educational social change. Instead of developing an emancipatory theory of reproduction, [correspondence theorists] have produced a notion of causality and domination that makes teachers and students appear merely as social puppets. (ibid.: 234)

Giroux’s concern introduces the second important concept of this section – namely ‘agency’. I see these concepts as closely related as freedom cannot be seen as something that can simply be ‘given’ from one to another, but requires an active agent to enable. Bhaskar elaborates on the necessity of agency when he notes that: “You cannot not act. You must act. If you abstain from acting, that too is an action is it not? That is an action, that is choice” (Bhaskar, 2002a: 307). Shipway explained Bhaskar’s argument that “even though [agents] may currently be slaves, as humans they still have access to the kernel of rationality from which emancipation stems” (Shipway, 2001: 194-195).

Archer argues for the importance of highlighting the “conditions under which different social groups can influence the prevailing definition of instruction” through processes of stasis and change. She

... rejects the premise of complementarity – that one group or class alone, anywhere and everywhere, possesses the conditions for imposing its definition of instruction. Instead, specification of the circumstances under which any group will influence educational stability or change would be expressed in relational terms (that is, what gives one group more negotiating strength than the parties with which it interacts) rather than positional terms (the political elite or dominant class) which supposedly guarantee unqualified success in educational interaction .(Archer, 1995: 222)

Archer’s (1998b – Section 2.4) morphogenetic cycle and Bhaskar’s TMSA (1998 – Section 2.4) and four-planar social being (1993 – Section 2.4) present the possibility of the power of agency to reproduce or change the status quo. To illustrate the power of agency Giroux (1980) describes the sociocultural patterns of resistance developed amongst factory workers, and furthermore highlights the mediation roles played in education processes, for example, the process of knowledge selection, distribution and evaluation – as highlighted by authors such as Bernstein. Bernstein argues against the labelling of his work as ‘structuralist’ when he explains that the institutional structure, relations between social groups, and the play of power relations amongst oppositional groups “create the struggle to dominate and change codes” (Bernstein, 1996: 127).

Despite Archer’s critique of Bernstein (Section 4.2.1), she highlights a useful aspect of Bernstein’s work in that he “accords proper theoretical importance to ‘structure’ as well as to ‘interaction’, viewing the former as shaping the contexts in which the latter takes place and conditioning the objective interests and subjective outlooks of the actors involved” (Archer, 1995: 219). The interests of Bernstein in mediation (highlighted by Giroux) and interaction (highlighted by Archer) reflect a consistency with critical realism’s description of society as not about individuals or groups, emphasising that in social life “only social relations endure” (Bhaskar, 1998b: 41).

Through a focus on mediation and interaction we can understand that “the school as an active cultural sphere functions both to sustain and to resist the values and beliefs of the dominant society” (Giroux, 1980: 231). It is this emphasis on sustaining/resisting domination/ change that introduces the possibility of morphostasis/genesis and agency that reflects “a view of human beings as active subjects [and which] replaces a functionalist view in which people are portrayed simply as bearers of predefined societal roles” (Giroux, 1980: 237).

Shipway applies the distinction between emancipatory and oppressive structures and the potential for stasis or change when discussing the role of teacher professionalism in the argument that:

Critical realism provides the tools to clearly delineate between becoming more reflective, evaluative, self-critical, and collegial and becoming more involved in the participation of power hierarchies, ‘professional subjectivities, and other heteronomous

orders of determination. By revealing the workings of underlying structures, critical realism can discern the empowering aspects of professionalism from the hegemonic aspects of professionalism. (Shipway, 2001: 186)

An important real-world constraint on agency is that of the limited capacity/mandate in the school context to transform deep structural problems. Jensen and Schnack (1997: 164) argue that “environmental problems are structurally anchored in society and our ways of living. For this reason it is necessary to find solutions to these problems through changes at both the societal and the individual level. This is why the aim of environmental education must be to make present and future citizens capable of acting on a societal as well as a personal level”. Jensen and Schnack remind us that if “solving environmental problems requires social and structural changes, then major demands are put on the teacher's ability to put individual actions and their potential into perspective, both locally and globally” (1997: 172).

Acknowledging this real-world constraint, critical realism’s ontological grounding enables an understanding of the possibilities (conditions) for teaching, learning and change. Brown argues that educators should focus on the learning environment, arising from the “(critical) realist premise that the possibilities for knowledge are given in the ontology. For educators this means the learning environment is not simply the location of learning, as widely construed, but the set of conditions that enable and constrain learning” (Brown, 2009: 5).

This leads to ontological questions in an educational and environmental movement context such as:

- 1) What must be the case for teachers to be best educated to teach in this national/regional/local, political/cultural/economic/ecological, professional development/school/community context?
 - 2) What must be the case for effective teaching, learning and transformative praxis in this national/regional/local, political/cultural/economic/ecological, school/community context?
- (Adapted from Brown, 2004).

Lotz-Sisitka (2005) describes two totalities significant to the field of environmental education, namely education and the environmental movement. She uses the notion of a position-practice (Bhaskar, 1979) system for this description. This system helps to identify useful units of analysis within different totalities. Bhaskar uses the notions of “positions (places, functions, rules, tasks, duties, rights, etc.) ... and practices (activities, etc.) as a system of mediating concepts representing a “‘point of contact’ between human agency and social structures” (1998b: 51). In this thesis **educational positions** are related to the roles and competencies defined in the Norms and Standards for Educators policy document (South Africa. Department of Education, 2000 – Section 4.3.3). **Educational practices** include lesson plan development and methods for teaching and learning. **Environmental movement positions** include the schools’ enrolment in programmes such as Eco-Schools (Section

3.3.1), as well as the roles of learners, teachers, community members, course tutors and non-governmental organisations in supporting environmental projects in the schools (their roles defined by their portfolios assigned formally through the school Eco-Committee, or informally in terms of the roles they take on themselves). Finally, **environmental movement practices** include activities such as waste management and permaculture gardening. Sections 7.2.1.1 – 7.2.6.1 (School and community context) and Sections 7.2.1.2 – 7.2.6.2 (Teacher and classroom context) of this thesis discuss these educational and the environmental movement totalities in the classroom/school/community social-ecological context.

4.2.3 Ethics, knowledge and truth

With the emphasis on the importance of identifying oppressive Power2 relations in the previous section, the question remains as to how such oppressive relations can be identified in educational contexts. A useful strategy is to begin with identifying aspects of the explicit, implicit/hidden and null curriculum which may influence interpretations and responses to environmental issues. The explicit curriculum refers to the stated curriculum (Eisner, 1985), defined by principles, goals, learning outcomes, knowledge interests and more.

The implicit curriculum refers to the ‘hidden curriculum’, or the curriculum that is not openly stated, but is required or implied by the explicit curriculum. It “includes values and expectations generally not included in the formal curriculum, but nevertheless learned by students as part of their school experience” (Flinders, Noddings, & Thornton, 1986: 34). The way timetables are structured may, for example, influence how much/what learners can learn, and this also forms part of the ‘hidden curriculum’. In the case of the South African RNCS, for example, a learning outcome expecting learners to “explain how recycling contributes to environmental health” implies, for example, that the teacher and/or the textbook will be able to provide knowledge of the link between waste and pollution, the life cycle of waste products which impact on environmental health at different points of extraction, production and transport, and the impacts on environmental health at these different points.

The null curriculum is defined by what is not said, discussed or included. Eisner described it as involving “the options students are not afforded, the perspectives they may never know about, much less be able to use, the concepts and skills that are not part of their intellectual repertoire” (Eisner, 1985: 107). Curricula that do not consider indigenous knowledge, for example, alienate learners from different ways of knowing, and may narrow the learning experience for some of the learners. In another example, the South African RNCS Economic and Management Science curriculum highlights the importance of production, consumption and profitability (South Africa. Department of Education, 2002c: 5) alienating learners from alternative economic systems which might put less pressure on the

environment. This concern parallels the ‘hijacking’ of the radical reform views of Dewey and Vygotsky in the interests of social administration (Popkewitz, 2001 – Section 4.2.1). A similar hijacking is evident in Jickling’s description of how education has been influenced by a corporate agenda so that schooling has become focused on “‘training’ workers and inculcating values essential in supporting corporate needs” (1997: 89). In this situation normative questions are simply not raised, and educational responses inadvertently become normatively impositional in and through their normalised assumptions.

In another example of alienation, Rommetveit, Funtowicz and Strand discuss how global warming and climate change discourse “is defined in a scientific context that is perceived as distant from and alien to the communities in which people live their lives and the public spheres in which they exert their citizenship” (2010: 159). The scientific and hypothetical concepts of this discourse are being translated into scientific and abstracted actions such as carbon trading which enables a scientific calculation of carbon production to be translated into an abstracted economic exchange (once more an example of a hijacking by a corporate agenda). This exchange then circumnavigates moral judgements on activities such as “excess use of natural resource for luxury items, the accelerated spending of limited and non-renewable resources on energy and materials, the spoiling of wilderness” and more (ibid.: 161). Lacey and Lacey, reflecting on the problem of climate change, propose that “the forms science takes and the kinds of questions it addresses, could be determined in collaboration with social movements and reflect their values and experiences” (2010: 197), thus arguing for the re-institution of science in a way that embraces a discourse not only driven by scientific ‘experts’ and imposed values derived from this discourse. This call is consistent with Bhaskar’s view of a transcendental realist account of science which is grounded in the “specificity and emergent properties of the social realm” (Archer et al., 1998: xiv – Section 2.1).

This broader discourse should support Bhaskar’s call for reclaiming reality by “eliminating the prejudices, errors, unsupported claims and philosophical false trails which have covered or disguised reality for us; and he talks of using this reclaimed reality as the only basis for emancipatory social practice” (Corson, 1991: 232 in Shipway, 2001). One useful strategy for eliminating these false trails is offered by Parker who suggests that social movements have a wide variety of moral resources on which to draw so that moral criticism can be “directed against practices which allegedly are not respecting ... existing social values. This may develop into a deeper critique of structures that shape or constrain practices” (2010: 221) .

Bhaskar’s notion of ‘alethic truth’ is another useful concept in eliminating false trails. He describes alethic truth as “optimally grounding reason, [which] can be the rational cause of transformative negating agency in absenting constraints on self-emancipation, that is, on the liberation of our causal

powers to flourish” (Bhaskar, 1993: 385) . In educational contexts this transformative negating agency would also require supporting learners to “pinpoint the real, but non-actualised, possibilities inherent in a situation, thus inspiring grounded hope to inform emancipatory praxis” (Bhaskar, 1998b: 112). For example, much emphasis is placed on recycling in schools, however recycling supports the economy of ‘stuff’ (which requires transportation, energy and packaging), de-emphasising reduction as another response to the waste problem. Education can support learners to consider potential reasons for recycling, for example, to feed the economy, create employment, or reduce pressure on the environment; and ask: Which of these impose “constraints on self-emancipation” and which are “optimally grounding reasons”? Then other “non-actualised possibilities” can be explored such as alternative economies that are less toxic, and not so dependent on non-renewable resources (Bhaskar, 1993: 385 – Section 4.2.3).

In another example, consider a debate often faced by communities experiencing unemployment when faced with the possibility of a new industry in the area. Couched in “an abstract universal ethic” of the right to development, an executive summary presented to South African press in September 2012 argued the national Department of Mineral Resources’ decision to allow the exploration of opportunities for fracking²⁸ in South Africa’s semi-arid hinterland known as the Karoo. The summary outlined a potential “R1-trillion boon to the economy” from the proposed fracking and highlighted economic benefits for the “severely deprived communities in the Karoo” (Mail & Guardian, 2012, no pagination). If educational processes can help learners to find the “optimally grounded reason” for fracking, then learners might be able to question the “real reasons” for promoting the project – for example, is the promise of economic boon going to primarily enrich unemployed locals or those in power in the petroleum industries? Is the use of natural gas going to solve the problem of climate change or only delay the problem of a limited supply of non-renewable energy resources?

The second challenge with ethical deliberations is values clarification. Rosenberg, O’Donoghue and Olvitt describe this as a process of “creating situations in which participants are challenged to think deeply about the values they hold, and how they relate to their actions and choices” (2010: 19). While this process has the potential to address the problem of alienation from spheres of citizenship as raised above, this process can potentially become problematically individualistic especially with an over-emphasis on child-centred education or naïve constructivism (Moll, 2002 – Section 1.3) where the teacher may clarify but never challenge the student’s values or where teachers fail to encourage “the development of a more social and structurally oriented insight” (Jensen & Schnack, 1997: 176). This can result in a situation where the acceptance of ‘many truths’ becomes necessary or members in a

²⁸The process of drilling down and creating tiny explosions to shatter and crack hard shale rocks to release the natural gas inside.

group might find themselves feeling obliged to accept a 'truth' which they have "good evidence against" (Price, 2007: 34). The problem with accepting many truths is that this leaves us with a difficulty of agreeing on a collective way forward when conflicts arise. With this concern in mind, environmental educators suggest a process of 'values analysis' which may follow the process of 'values clarification'. Fien draws on Knapp to call for "skills of analysing alternative viewpoints on environmental issues, recognizing the values that underlie them, and evaluating the consequences of alternative solutions to environmental problems" (1983 in Fien, 1993: 63).

The difficulty of identifying a way forward is also evident in what Price describes as "extreme post-structural" irrealism where "there is no reality beyond our mind's representations" (2007: 79) and therefore no possibility of truth. Shipway explains the stance of a postmodern theorist drawing on Slattery who argues that a postmodern curriculum should encourage "chaos, non-rationality, and zones of uncertainty because the complex order existing here is the place where critical thinking, reflective intuition, and global problem-solving will flourish" (Slattery, 1995: 230 in Shipway, 2011: 130). Price suggests that such a "pure underpinning of postmodernism" is rare in environmental education because it "offers little in the way of guidance towards social transformation" (2007: 31) (as with naïve constructivism). In education this raises questions as to whether the intention of an exploration of representations of the mind is simply to share knowledge of a wide variety of political and cultural beliefs or to (problematically) suggest that "any and all frameworks of belief constitute a viable alternative" (Shipway, 2011: 131). In the educational context, Shipway argues that "the curriculum must do more than just balance multiple local interests; it needs to have a defensible ontological link to the deeper strata of reality that underpins the 'local', such as the concept of social justice" (2001: 139). This argument suggests a relational-processual approach to education (as described by Price) in which

... neither the world nor the mind is the ultimate authority. Truth is co-constructed by the mind and the world, where the world is made up of networks or relationships of interlinked, mutually constructing, humans and non-humans. Objectivity is possible but qualified and objects are seen as processes first and objects second. (2007: 39)

When ethical deliberations are needed to inform agency, finding such defensible ontological links is important so as to avoid either action paralysis or actions incommensurate with the values people hold. For example "someone may appreciate a litter-free environment but, in the absence of waste management services in an informal settlement, have limited options to dispose of their waste" (Rosenberg et al., 2010: 19), so that the action of dumping is rooted in social injustice and incommensurate with valuing a litter free environment. This problem is further illustrated by Shipway who explains that the "axiology of emancipation [stems from] being involved in a dialectic between the pull of universal moral tendencies, and the constraints of a real world" (Shipway, 2001: 194-195). From this I understand that value-related quandaries arise when tensions and contradictions exist

between an understanding of what is deemed to be universally good and what is possible in a particular context. Such quandaries would arise when a context of poverty and inequality precludes an individual from access to (what could be argued to be) a ‘universal moral tendency’ towards autonomy or self-determination. Such exclusion might arise because that individual does not have the knowledge, power and/or opportunity to act in his/her real interests (Bhaskar, 1993 – Section 2.2).

As an example illustrating one of these value-related quandaries, consider a re-use action popular in the Eastern Cape, that is, the economy created by crocheting mats and hats from discarded plastic shopping bags. While this activity provides a financial ‘stop-gap’ in a country with high unemployment rates and inequality, it in no way substantially addresses the problem of excess production and consumption of non-recyclable plastic. Should we be accepting without question an economy that allows one sector of society to make a meagre living from waste discarded by a more affluent sector? In an educational context we would acknowledge that there is agency evident in this action which might empower an unemployed person with more (financial) freedom than before, but would still need to ask value-driven questions such as: Is this an example of reproductive or transformative agency? Is the ‘trickle-down’ economy from affluent to less-affluent sectors of society a mutualistic relationship (where one cleans up the waste of another but makes a living in the process) or a master-slave relationship? What other aspects of freedom should be considered in constructing a new economy for the country which may create other opportunities for self-employment and local co-operatives? In other words: “Are there other sources or conditions in society which are more important with reference to the actual environmental problem?” (Jensen & Schnack, 1997: 172)

A third challenge with ethical deliberations in education is who decides and how do we decide on “the nature of the good” (Sayer, 2000: 159) and how do we ensure that propositions for transformative action are not simply “empty moralizing” (ibid.: 178 – Section 3.4)? This question can be addressed through the notion of concrete universality where abstract universal ethics is rejected in favour of a concrete universality. Bhaskar describes concrete universality as a “multiple quadruplicity” (1993: 129) comprising 1M universality (considerate of universal rights and freedoms), 2E processuality (meaning dynamic and changing), 3L mediation (in relation to totality) and 4D concrete singularity (requiring context-sensitivity where “all individuals, though sharing a common humanity, [are treated] as ethically different” (Hartwig: 2007: 74)). Also pertinent at 4D when considering concrete universality is an “expressively veracious” judgement form (Hartwig, 2007: 299) “with the universalising implication that this is what you and others would do in exactly the same situation” (Norrie, 2010: 133 – Section 2.6.4). Concrete universality also encapsulates the notion of eudaimonia (Section 2.2) where rights and freedoms are “historically specific, concretely singularised and open; the norms enshrining them will be the norms of the communities concerned, not those of the abstract universal” (ibid.: 492). Applied to the question of ethics Parker, explains that “to hold that an ethic

must be universalisable means that it must be capable of being ethically meaningful to any moral agent, not that all moral agents should treat everyone the same” (2010: 224).

One of the elements of concrete universality, that is totality, requires consideration of the importance of moral sentiments in relation to human and non-human. Price offers insight into ‘the nature of the good’ when she argues that: “if we are part of the world, then to take care of oneself, is to take care of the world, but to sacrifice oneself in certain circumstances to ensure the well-being of others is still to take care of oneself, since the self is part of that totality” (ibid.: 251). Also, beyond the non-altruistic self-interest implied in this statement, Price explains that assuming “humans and non humans are a ‘totality’, connected in an intimate web of relating, then awareness of this connection, or sympathy, leads to moral sentiments which may be altruistic” (2007: 250). Elaborating on this notion of altruism, Bhaskar and Parker argue that

... care, on all four planes of social being [Section 2.4], while compatible with an overreaching philosophical non-anthropocentricity, can form the basis for a new immanent humanist ethic that is capable of sustaining a continuing commitment to human emancipation and self-realization, rather than just mere survival. (Bhaskar & Parker, 2010: xii)

Cheney and Weston (1999), by reflecting on the relationship between ethics and knowledge, argue for a non-anthropocentric philosophy in their argument that the field of environmental philosophy is in need of a new ethics-based epistemology rather than the more conventional epistemology-based ethics. The latter is based on an approach to ethics where non-humans are imbued with human qualities in order to argue for their value. For example “that animals feel pain, or are self-conscious, or have expectations that can be violated, is supposed to be the basis upon which they might be attributed rights (ibid.: 116). In arguing for an ethics-based epistemology, Cheney and Weston (ibid.: 120) call for an ethics-based “universal consideration” of “all things” which does not lay the “burden of proof” in order to command courtesy from humans. They argue that without extending this courtesy, we may be “blind to the possibilities right next to us, we may never know what we are missing, and we may close them down or even destroy them as a result”. This problem associated with an epistemologically-based ethics is illustrative of what critical realists term the ontic fallacy which “views knowledge as an unproblematic, direct mapping between subject and being” (Shipway, 2001: 64), thus transforming subjective interpretations into “objective sense data” (Irwin, 1997 in Shipway, ibid.).

Furthering the idea of Cheney and Weston’s ethics-based epistemology is Parker’s point that “because we live in a real world it is morally incumbent upon us to find out about it: lack of knowledge reduces our capacity for effective moral agency (2010: 223). By combining the ideas of Cheney and Weston and Parker a process can be proposed where respect and care for all, calls for knowledge of being

which can then be applied in better care for all beings, or new ‘becomings’ (Norrie, 2010 – Section 2.6.2).

And elaborating on another element of concrete universality – the notion of concrete singularity – Bhaskar explains that “if we take the goal of human freedom to be human autonomy then what is to be liberated is the concrete self so that a genuine self-determination is obtained” (Bhaskar, 1993: 278). Bhaskar explains that the nearest synonym to the concept of ‘concrete’ might be “‘well-rounded’, in the sense of balanced, appropriate and complete for the purposes at hand” (1993: 128). He argues that it is “*concrete singularity* [that is] the key to the realm of freedom” (ibid.: 131). Considered as part of the “multiple quadruplicity” the context-sensitivity of concrete singularity cannot make the mistake of local conservatism (Lotz, 1999 – Section 3.4). Secondly, the notion of concrete singularity can help to address the potential problem within liberal forms of government identified by Dean who expresses concern about the “way in which the free subject of liberalism is divided against him or herself in so far as the condition of a mature and responsible use of freedom entails a domination of aspects of the self” (1999: 156).

Thus, in relation to the question of how we decide on the nature of the good, the above reflections have illustrated how the notions of an ethics-based epistemology and the concrete universal will enable teachers and students to find or construct what Price refers to as “‘good enough’ (not absolute) truths that will inform their action” with the argument that “justification for a person to believe something therefore comes in degrees; it is not an absolute either/or situation” (Price, 2007: 39).

4.2.4 Relevance for active learning

Section 3.4 highlights that in considering the notion of **situated** active learning, local knowledge needs to be related to ‘new’ knowledge. Considering new knowledge as a ‘new way of seeing’, there are a number of new ways of seeing proposed in Section 4.2 above. That is, firstly, the notion of laminated totalities (Bhaskar, 2010 – Section 4.2.1) and, secondly, the notion of exploring positions and practices (Bhaskar, 1998 – Section 4.2.2) in socio-ecological contexts. These tools can be applied to information and enquiry activities in classroom/fieldwork situations and can enable exploration of “non-actualised possibilities “and associated absencing processes (Bhaskar, 1998: 215 – Section 2.6.3) so that proposed actions emerging from these situated exploration are realistic. Also, such enquiries can help to identify 2E “inconsistency or contradiction” (Hartwig, 2007: 130 – Section 2.6.2) which plays a key role in informing change-oriented active learning that is not only realistic, but also relevant. The interest in “inconsistency or contradiction” has the potential to enable a critical approach to education and an associated transformative, rather than authoritarian, approach to governmentality (Popkewitz, 2001 – Section 4.2.1). Combined with an interest in “non-actualised possibilities”, such

enquiries enable normative questioning without proposing idealistic and unrealistic alternatives (as the Hegelian dialectic is prone to). Finally, the combination of these two interests enables a sensitivity to context which mitigates against the exclusion of certain sectors of society (to which a liberal approach to education is prone) in that inequalities and injustices are identified, while relevant context-sensitive educational responses and environmental action can be proposed.

Section 4.2 also has implications for the '**action-orientation**' of active learning. An imposed action such as is typical with a technicist/behaviourist approach to education, and with a view of the overly passive agent (Section 4.2.1) can undermine the educational project. The call for an emancipatory approach to the notion of governmentality (in which oppressive structures are distinguished from more caring and pastoral ways of governing through the 'freedom' of the subjects) represents a meeting point between a critical approach to education insisting on emancipation from oppressive Power2 relations, but which is not ideologically imposed, and a liberal approach insisting on the freedom of all through the nurturing of enabling Power1 relations.

An emancipatory approach to governmentality calls for reflection on who decides on actions – that is a call for consideration of democracy in active learning processes. A **deliberative and co-engaged** interpretation of active learning (Section 3.3.3) highlights the importance of 'deep democracy' (Wals, 2007a – Section 3.3.3) in active learning processes. This links to the liberal education ideal of Dewey and Vygotsky as described above, with an interest in societal reform and a vision of a proactive agent responsive to unpredictable and changing societal needs. This is important in the field of environmental education, and particularly in the **action-orientation** of the active learning framework, which needs to encourage the notion of a reflexive agent in the context of uncertainty, complexity, conflict and/or divergence (Wals, 2009 – Section 3.2).

Also highlighted in Section 3.3.2 is an action competence approach to environmental education which furthers the notion of a reflexive agent in action-oriented active learning processes. This approach has the potential to develop the notion of 'action' as "conscious, considered and targeted" (Jensen and Schnack, 1997: 165 – Section 3.3.2). Such reflexivity can be contrasted with a behaviourist approach to education which has a tendency to impose technicist solutions in response to societal problems. In such an approach, democracy does not strongly feature and "practice is reduced to technique" (Jensen and Schnack, 1997 – Section 4.2.1).

While behaviourist approaches have been criticised for imposing technical solutions to environmental problems, critical theory has been criticised for a different type of imposition – that is an ideological one such as informed by a Hegelian dialectic (Section 2.6.3). This mirrors the concerns with ideological imposition in environmental education as raised by Jickling and Spork (1998 – Section

3.4). Section 4.2.3 has implications for a **deliberative and co-engaged** approach to active learning processes which would present a less impositional way of dealing with ethical deliberations in environmental education contexts. These implications are summarised in the following paragraphs.

Firstly, Section 4.2.3 illustrates how using an explicit/implicit/null curriculum analysis (Eisner, 1985) can distinguish the stated curriculum from associated curriculum assumptions that may or may not be feasible or appropriate, as well as reveal issues of alienation from alternative ways of knowing and being and also alienation from people's sphere of influence. Secondly, Section 4.2.3 considers values clarification (Rosenberg, O'Donoghue and Olvitt, 2010) (in relation to individual actions and choices) as a way of addressing the problem of alienation from spheres of influence, and proposes an additional process of 'values analysis' (Fien, 1993) to mitigate against too individualistic an approach which can hinder the identification of a collective way forward when conflicts arise from the acceptance of 'many truths' (Price, 2007). Secondly, critiquing extreme post-structuralism's acceptance that there is no possibility of truth (ibid.), the section highlights the importance of a search for defensible ontological links to deeper strata of reality (Shipway, 2001). Thirdly, the section considers some strategies for identifying the nature of the good such as drawing on an ethics-based epistemology (Cheney & Weston, 1999) extended by an emphasis on the need to know the world so that we know how to care for it (Parker, 2010). Finally concrete universality is proposed as a way of working with value-questions in a way that guards against local conservatism (Lotz, 1999) and a potentially 'divided subject' (Dean, 1999).

This section has dealt with broad orientations to education and their implications for active learning. The following section considers these orientations in relation to teacher professional development with specific reference to teacher professional development in South Africa.

4.3 ACTIVE LEARNING AND TEACHER PROFESSIONAL DEVELOPMENT IN SOUTH AFRICA

4.3.1 Evolving teacher professional development policy in South Africa

Giroux explains that competing ideologies become evident in school curricula when, for example,

members of the technical intelligentsia voice strong support for a curriculum that will produce scientists and technically skilled workers [while] sections of the intelligentsia who work in the cultural realm often support progressive modes of education that call for a loosening of authority in the classroom and a greater opportunity for students to work with a relative amount of freedom in a broad-based integrated curriculum.
(Giroux, 1980: 233-234)

A tension between these two purposes is evident in discussions on teacher professional development in South Africa, underpinned by the ideas of Bernstein. Bernstein considers the differentiation between “a pedagogic practice that is dependent on the economic market – that emphasises vocational education – and another that is independent and autonomous of the market – that is legitimated by the autonomy of knowledge” (Bernstein, 1990 in Sadovnik, 1995: 11). The former can be described as a performance model of curriculum which would be concerned with “specific knowledge and skills and well-defined criteria of right and wrong” (Taylor, 1999: 108) with an assessment that is “atomistic, explicit and measurable” (Harley & Parker, 1999: 184). The latter can be described as a competence model which has broadly defined outcomes of learning with no specifically prescribed learning process (Taylor, 1999) and an assessment which is “holistic, tacit and inferential” (Harley & Parker, 1999: 184).

Fitting the description of a performance model of curriculum, the Wits Education Policy Unit (2005) described a teacher profession during the apartheid era in South Africa dogged by tight curriculum control and a system of inspection where teachers were punished to the point of being dismissed if they did not comply with expectations: “The excessive control of teachers’ work under apartheid did not only limit the power of educators to be creative in performing their duties, and caused suspicion, but it had also resulted in ... dependence among some teachers”(Wits Education Policy Unit, 2005: 14).

The following discussion highlights two persistent threads that can be seen woven within the competence model prevalent in post-apartheid teacher professional development policy discourse, namely, reflexive competence and applied competence. The notion of reflexive competence was introduced with the new curriculum in 1998, where a competence-based model was implied with an emphasis on “greater professional autonomy [which] required teachers to have new knowledge and applied competences” (South Africa. Department of Education, 2007: 4). Christie (1997) described competence as “the ability to apply skills to performing a task, and encompass theoretical understanding of the task, as well as the ability to transfer knowledge, skills and understanding to another context” (ibid.: 56).

Reflexive competence was defined in the South African national teacher professional development policy – the Norms and Standards for Educators document – as a combination of practical (ability to ‘do’) and foundational (ability to understand) competence ... in which the learner demonstrates “the ability to integrate or connect performances and decision-making with understanding and with an ability to adapt to change and unforeseen circumstances and to explain the reasons behind these adaptations” (South Africa. Department of Education, 2000: 10). Teachers were expected to integrate reflexive, practical and foundational competencies in a demonstration of ‘applied competence’.

The 2005 South African Report of the Ministerial Committee on Teacher Education appeared to continue an interest in this second thread, namely applied competence, with its description of a professional teacher as one who “is characterised more by a commitment to the ideals of the profession, and flexible competences to pursue those ideals in a variety of circumstances, than by mere obedience to the legitimate requirements of an employer” (Jiya, Samuel, & Morrow, 2005). This is also illustrated by the view of teaching as “a situated and interpretative contextual practice that ... cannot be reduced to skills and routines” (ibid.: 6).

An interest in applied competence is still evident in the 2011 teacher professional development policy which focuses on “integrated and applied knowledge” which is elaborated as “scrutinising, fusing together and expressing different types of knowing in the moment of practice” (South Africa. Department of Higher Education and Training, 2011: 7).

4.3.2 Teacher professional development and transformation

A third persistent thread in teacher professional development discourse is a political agenda for social transformation. Having outlined reflexivity and applied knowledge as key interests in a competence approach to teacher professional development and as two persistent threads in South African teacher professional development discourse, this section continues with a further distinction in curriculum considerations, notably whether a competence model has ‘progressive’ or ‘radical’ intentions. In 1999 Taylor argued that the South African Qualifications Authority²⁹ embraced both progressive and radical competence approaches to curriculum development. A progressive competence approach resembles the liberal democratic view of education (Section 4.2.1) with an emphasis on developing learners’ ability to “ask questions, evaluate evidence, defend arguments, and apply ... knowledge to new situations” (Taylor, 1999: 111). The above-mentioned policy narrative of an autonomous, (self) reflexive teacher with the ability to apply knowledge in practice is representative of a progressive competence curriculum model.

This model articulates its learning goals mostly in cognitive terms, while a radical competence curriculum model has a distinct political agenda. With its list of higher order thinking skills (critical outcomes) and the call to relate these to “social, political and economic contexts in which knowledge and skills are acquired and applied” (developmental outcomes), Taylor described South Africa’s post-apartheid curriculum as having both progressive and radical competence elements (1999: 111).

²⁹Teacher professional development qualifications in South Africa are governed in part by the South African Qualifications Authority which is the custodian of the National Qualifications Framework. The National Qualifications Framework is a system for registering qualifications and unit standards which may be accumulated within or towards a particular profession. The system is also responsible for recording the learning achievements of learners in terms of those qualifications and unit standards.

However, the progressive competence agenda in South Africa is open to similar implementation challenges to those described in Section 4.2.1 where an interest in reform is blocked by an authoritarian approach to governmentality. For example, the vision of increased autonomy for teachers was put into practice through the South African Integrated Quality Management System (South Africa. Department of Education, 2002a) in which the government attempted to support “a shift from the system of inspection to a system of self-evaluation and external evaluation ... [and] locate teachers in their working environment rather than judging their performance in isolation to their working environment” (Wits Education Policy Unit, 2005: 22). However this system was criticised in practice for focusing more on managerial aspects of teacher professionalism than on teacher needs with a result reminiscent of a behaviourist approach to teacher professional development couched within an authoritarian approach to governmentality (Section 4.2.1).

Despite these implementation challenges, a persistence of a transformative agenda, and a radical competence approach to teacher professional development, are evident in statement in the new teacher education policy that teacher education should:

address the critical challenges facing education in South Africa today – especially the poor content and conceptual knowledge found amongst teachers, as well as the legacies of Apartheid, by incorporating situational and contextual elements that assist teachers in developing competences that enable them to deal with diversity and transformation. (South Africa. Department of Higher Education and Training, 2011: 6-7)

Teachers are expected to “work in nuanced ways with the diverse challenges faced by children in schools and the communities that they serve, for example HIV and AIDS, poverty and the lingering effects of apartheid; dealing with diversity; promoting inclusivity; and environmental sustainability” (ibid.: 12). Therefore this policy appears open to probing the reproduction of the status quo of inequity in power and economic relations as highlighted by Popkewitz, Giroux, and Shipway above.

4.3.3 Teacher roles

Also significant to the vision of ‘greater professional autonomy’ in a competence-based model for teacher professional development, is consideration of the roles of teachers as professionals. During the implementation of the Schools and Sustainability Course, teacher professional development was guided by the above-mentioned South African National Department of Education’s policy document: Norms and Standards for Educators, which defined a number of roles for educators, namely: learning mediator; interpreter and designer of learning programmes and materials; leader, administrator and manager; scholar, researcher, lifelong learner; community, citizenship and pastoral role; assessor; and learning area/subject/discipline/phase specialist (South Africa. Department of Education, 2000: 13).

These roles were reiterated in the National Policy Framework for Teacher Education and Development in South Africa (South Africa. Department of Education, 2007) and were a significant consideration in the development of materials for the Schools and Sustainability Course. However, it is important to take cognisance of Morrow's (2007) concern for what he believed to be an inflated role of teachers. He argued that this was a result of conflating the roles of teachers, education managers, curriculum advisors, and others in the teacher education policy. He also argued that another conflation was between the concepts of 'teaching' as a practice and 'teacher' as a career, so that the Norms and Standards document with its seven pages elaborating on the seven roles, became more like a "high-level job description" (ibid.: 98) than an outline of what professional development a teacher needs in order to teach (see Appendix H – Question 15 which questions teachers about their views on these roles).

The policy interest in the role of the teacher is continued in South Africa's most recent teacher education policy – the 2011 Minimum Requirements for Teacher Education – where the same roles for educators are once more reiterated. However, the roles are presented in a different way in that the document states that they "must be interpreted as functions carried out by the collective of teachers in a specific school" (South Africa. Department of Higher Education and Training, 2011: 10), thus responding to the critiques of the inflated role of teachers mentioned above. In addition, the new teacher education policy is different in that it foregrounds what a teacher needs to learn rather than what a teacher needs to be as a teacher – thus addressing Morrow's second concern about the conflation between the notions of 'teaching' and 'the teacher'. A renewed emphasis on learning is evident in the five types of learning necessary for the new vision of the 'knowledgeable teacher'. These are specified by the policy as:

- *Disciplinary Learning: Including educational foundations (such as ethics, history, sociology, psychology, politics) and specialised subject matter;*
- *Pedagogical Learning: Essentially about how knowledge is to be learned generally and specifically with respect to the subject discipline;*
- *Practical Learning: Learning in (through 'trying out' in authentic and simulated situations) and from other practices (through videos, observations, and case studies);*
- *Fundamental Learning: Including conversing in a second language, use of information and communication technologies, and various academic literacies;*
- *Situational Learning: this refers to "knowledge of the varied learning situations, contexts and environments of education (classrooms, schools, communities, districts, regions, countries and globally), as well as to prevailing policy, political and organisational contexts". (ibid.: 7)*

4.3.4 Teacher knowledge

Section 4.3.1 noted the importance of foundational competence in the 2000 Norms and Standards for Educators. The Norms and Standards also required teachers to "have a well-developed understanding of the knowledge appropriate to the specialisms" (South Africa. Department of Education, 2000: 14)

and saw teachers as “learning mediators” that needed to prepare “thoroughly and thoughtfully for teaching by drawing on a variety of resources; [such as] the knowledge, skills and processes of relevant learning areas” (ibid: 15). The latest teacher professional development policy holds that a reflexive teacher needs a strong knowledge base to inform her/his practice, hence an emphasis on “knowledge, reflection, connection, synthesis and research [giving] ... renewed emphasis to *what* is to be learned and *how* it is to be learnt” (South Africa. Department of Higher Education and Training, 2011: 7). The emphasis on a strong knowledge base for teacher professional development is argued because a

... purely skills-based approach, which relies almost exclusively on evidence of demonstrable outcomes as measures of success, without paying attention as to how knowledge must underpin these skills for them to impact effectively on learning, produces technicians who may be able to replicate performance in similar contexts, but who are severely challenged when the context changes.(ibid.: 10).

The knowledge in ‘disciplinary learning’ can be summarised as knowing what to teach and why, in ‘pedagogical learning’ as knowing how to teach, in ‘practical learning’ and ‘situational learning’ as knowing what the implications are in own and others’ practice and context, and ‘fundamental learning’ as knowing the basic skills to facilitate learning. In this way knowledge is re-centred as core to competence development. This emphasis on teachers having this wide range of knowledges is significant if one considers how choice can be narrowed by “an exclusion of known alternatives” (Hartwig, 2007: 37 – Section 2.5).

The above-mentioned focus on teacher roles, competencies and knowledge needs to be considered in the light of implementation challenges faced by the education profession. Taylor, Fleisch and Shindler (2008) attribute the primary problems with education in South Africa (many of which can be related to histories of inequality in education – Section 1.4) to:

- *Rapid expansion of the system with quality education compromised due to the (albeit necessary) focus on accessibility.*
- *Systemic inefficiency resulting in infrastructural and furnishing inadequacy and lack of access to learning and teaching support materials.*
- *Poor teacher subject knowledge exemplified by poor performance in four tests (Literacy, Numeracy, Mathematics and Science) administered by the national Integrated Education Project (Section 1.4).*
- *Use of time in which education is compromised by “teacher absenteeism, inappropriate timetabling, a variety of activities which interfere with time spent teaching, and ineffective teaching practices once teachers are in the classroom” (Taylor et al., 2008: 50).*

4.3.5 Relevance for environmental teacher professional development and active learning

Section 4.3.1 described a pre-apartheid dominance of a performance model of teacher professional development, followed by a post-apartheid dominance of a competence model of teacher professional development. Within the competence model of teacher professional development, the section started by highlighting two threads that have persisted across the teacher professional development policy discourse, namely, reflexive competence and applied competence. Central to reflexivity is supporting teachers to address the gap between what they “*think* they do, and what they *actually* do; between what they *want* to do and what they are actually *able* to do in their particular setting”(Janse van Rensburg & Mhoney, 2000: 47, original quotation marks). Janse van Rensburg and Mhoney also imply an interest in applied competence when they argue that these gaps “can only be developed in the context of practice, in a process of working through the relationship between theory and practice (ibid.: 47).

An interest in both of these competencies was evident in South Africa within action research approaches to environmental education teacher professional development “through which practitioners plan and act in their work contexts” (illustrating an interest in applied competence), “then reflect on the outcomes of their actions, and revise their action on the basis of these reflections” (illustrating an interest in reflexive competence)(Janse van Rensburg, 2000: 23). These competencies were further translated into practice through the introduction of a spiral approach to cluster-based teacher professional development (Janse van Rensburg & Mhoney, 2000) which called for programmes to be structured in such a way that teachers worked on tasks in between workshops/meetings, so that workshops became an opportunity both to introduce new knowledge and for sharing and reflection on tasks (Section 6.3.2.1).

The influential Danish funded, South African Learning for Sustainability Project initiated in South Africa in 2000 (Section 6.3.2.1) worked with the notion of a “reflexive practitioner” who would “consider not only the technical skills of teaching, but also educational aims and consequences, and ethical and value-based issues” (ibid.: 23). This has significance for a deliberative approach to active learning (Section 3.3.3) which requires a teacher that can help learners to clarify ethical issues and at the same time raise questions regarding values that are oppressive or alienating (Section 4.2.3).

The notion of applied competence, together with the new South Africa national teacher education policy interest in ‘situational learning’ (Section 4.3.4) has significance for situated approaches to the active learning framework. Applied competence can support teachers in developing situated approaches to active learning which help learners to deal with contextualised environmental issues which are uncertain, complex, conflicting and/or divergent (Wals, 2009 – Section 3.2).

Section 4.3.2 highlights the explicit transformative agenda in current South African teacher professional development policy. This agenda was also evident in the Learning for Sustainability project mentioned above in its critical conception of action research which engaged teachers in “transformation not only of practice, but also of the context in which practice takes place” (Janse van Rensburg, 2000: 23). This agenda is consistent with a (non-imposed) transformative agenda explicit in an action-oriented approach to the active learning framework (Jickling and Spork, 1998 – Section 3.4).

Section 4.3.3 highlighted a changed perception in the expectation that teachers should be expected to fill a large number of roles at an individual level in the school. However, each of the named seven roles can be argued to be significant for environmental learning. Section 9.3 of this thesis revisits these roles highlighting for example, the ability of a teacher as ‘designer of learning programmes and materials’ and as a ‘scholar, researcher and lifelong learner’ to support an approach to active learning which is responsive and situated in relation to contemporary and relevant environmental risks and concerns.

Section 4.3.4 highlights teacher knowledge. This is significant given the concerns raised in Section 1.3 regarding teachers’ knowledge of contemporary environmental issues and risks (Raven et al., 2005; Lotz-Sisitka, 2011, Mbanjwa, 2002; Nduna, 2003) and the understanding that “in-service teachers need to overcome their disadvantage of not having had environmental education in their initial teacher education” (Reddy, 2011: 17). It is also relevant to the ‘information’ dimension of the active learning framework which requires a deliberative approach to active learning for which teachers need their own in-depth knowledge of both subject knowledge and environmental issues and risks in order to help learners to gain an understanding of phenomena that go beyond their pre-conceptions and prior knowledge (Hoffmann, 2005 – Section 1.2) and that are capable of “deepening of knowledge or process skills from specific learning areas” (Lotz-Sisitka & Raven, 2001 – Section 1.3).

4.4 KEY FEATURES OF ENVIRONMENTAL EDUCATION TEACHER

PROFESSIONAL DEVELOPMENT IN RELATION TO ACTIVE LEARNING

Section 1.3 introduced the Learning for Sustainability project (see Figure 1.1) as one of the early teacher professional development programmes to engage with the new post-apartheid curriculum. This section presents a number of key features of a cluster-based approach to environmental education teacher professional development highlighted by the project (Section 1.5). Groups of these features are discussed in turn with reference to some to their theoretical roots and other national, regional and

international environmental education teacher professional development programmes. In each sub-section these features are related to notions of active learning as situated, action-oriented, deliberative and co-engaged as presented in Chapter 3. These same features are revisited in Section 6.3.2 in a review of influences of the Schools and Sustainability course (the context of this case study research).

4.4.1 Contextualisation, flexibility and constructivism

An interest in contextualisation is a response to concerns that abstracted curriculum knowledge creates a “gap between ‘book’ knowledge and the learners’ life world or life style” (Janse van Rensburg, 2000: 16) and the particular environmental issues that they encounter. Janse van Rensburg (ibid.: 17) relates an interest in contextuality to “social constructivist pedagogies which, recognise that the development of learners’ understandings is socio-culturally mediated” as highlighted in the work of Vygotsky.

Robottom and Kyburz-Graber (2000) report on a “tension between contextuality and universality” in two environmental education teacher professional development projects, namely the Organisation for Economic Co-operation and Development’s Centre for Educational Research and Innovation project “Environment and School Initiatives” – involving some 20 countries for 13 years (at the time of publishing the paper), and a South African-Australian collaborative programme involving eight tertiary institutions in the two countries – an AusAID funded project titled: “Educating for Socio-Ecological Change: Capacity Building in Environmental Education, Focusing on South Africa’s Tertiary educators” (2000: 250). Without losing the important subtleties raised in Section 4.2.3 regarding Bhaskar’s notion of concrete universality, Robottom highlights the problem with (abstract) universality with respect to ‘dissemination’ as represented by a “Research, Development, Dissemination, Adoption model” of materials development which militates against “participatory research-based development of original, contextual curriculum materials” (ibid.: 260).

Fien argues for flexibility within teacher professional development programmes when he emphasises that “the cultural and educational diversity in the region requires a framework for professional and curriculum/resource development which gives direction to participants but is flexible enough to accommodate local concerns and priorities (Fien & Tilbury, 1996: 70)”. This illustrates the importance of designing flexibility **into** materials and programmes, particularly in international collaborations where ‘outside’ facilitators might be unfamiliar with “local cultural and educational requirements” (ibid.: 70). An example of flexible course structure can be found for example in the “WWF International Course” which was run for members of the Southern African Development Community (SADC) region. This course had a broad curriculum framework of open-ended themes while participants’ “experiences from where they lived and worked (their stories) became the texts

upon which the course programme was negotiated” (Tlaleane in Lotz, 1999: 18) thus enabling “a diversity of responsive and flexible curriculum processes” (ibid.: 20).

Another strategy for a flexible course structure is framing a course around particular outcomes or competencies as with an outcomes-based curriculum model. Lotz (1999) reports the use of this strategy within environmental education courses for adults (referring to Ibo in Namibia and Molose and van Harmelen in South Africa). She described how having outcomes in mind enabled course presenters to “develop the courses in different ways and even use different materials, while allowing participants to meet the same requirements for certification” (Lotz, 1999: 22). It is this strategy that influenced the Schools and Sustainability course which is the focus of this research (see course outcomes as discussed in Table 6.3).

In a South African-United Kingdom collaborative project researching environmental education teacher professional development within tertiary institutions, a further point on the notion of contextualisation was raised by Schudel, le Roux, Lotz-Sisitka, Loubser, O’Donoghue and Shallcross (2008). These authors highlighted the importance of viewing courses as opportunities for involving teachers in contextualising processes rather than imposing predetermined contextualised materials on them (Schudel et al., 2008). The implication of this point is that teacher professional development needs to research strategies to help teachers to explore their own context **in a participatory contextualising process** rather than to research contexts per se in the interests of presenting a predetermined ‘relevant’ **contextualised course to** teachers. This is important as “adult educators need to recognise that it is virtually impossible to strive for mastery and transmission of an all-embracing knowledge of a field, or of universal ‘messages’” (Lotz, 1999: 18).

The notions of flexibility and responsiveness are important in teacher professional development programmes that have an interest in supporting a situated approach to active learning as presented by O’Donoghue et al. (2007 – Section 3.2). A course with an open framework will support teachers to work with learners to choose and define a relevant environmental focus within an active learning framework – a pedagogical model which itself supports “open-ended processes” (O’Donoghue, 2001: 7 – Section 3.2).

4.4.2 Participation, dialogue and democracy

Participation is closely related to the previous features, as the process of contextualising is strongly dependent on the participation of those for whom materials or programmes are intended in order to make these ‘come alive’. Drawing on experience from the same two projects introduced above (“Environment and School Initiatives” and the AusAID project), Robottom and Kyburz-Graber

highlight how action research projects are dependent on participatory processes enabling “teachers to develop curriculum strategies which involve students in a dynamic learning process focused on concrete environmental problems and issues encountered in their own communities at the local level” (2000: 262). Stevenson contrasts the long term and participatory nature of the action research model with “a model of isolated input-oriented workshops” (Stevenson, 2002: 192).

In a special *Journal of Education for Teaching* issue on ‘Teacher Education for Sustainable Development’ which features environmental education teacher professional development from numerous countries worldwide, Shallcross and Robinson comment on the strong emphasis on action research in the featured ‘northern’ papers (USA, Canada, Hungary, Italy and Belgium) which “focus on social and environmental justice” (2007: 146). However action research is not limited to these countries and has become influential in environmental education teacher professional development in South Africa (Janse van Rensburg, 2000 – Section 4.3.5; NEEP-GET, 2005b). In another example, Alsop, Dipbo and Zandvliet emphasise the role of action research in “very local and very specific projects of social transformation” such as in the case of a teacher professional development programme in Peru where one of the teachers engaged learners and parents in an extended process of dialogue, engagement and demonstration addressing the question of the effects of domestic and community violence in schools (2007: 216).

Lotz (1999: 23) argues that “participatory orientations to curriculum development have been influenced by global trends towards the democratisation of institutional and social life”. A leading thinker in highlighting the importance of democratic processes in educational contexts was the Brazilian adult educator Paulo Freire. Janse van Rensburg describes Freire’s vision of education as “a democratic practice of empowerment, based on an active method” (Janse van Rensburg, 2000: 10). She described the features of this vision as including dialogue, real-life experience, working with one’s own culture, and active social involvement (ibid.). In South Africa, the Learning for Sustainability Project Figure 1.1 – Section 1.3) was influenced by Freire’s “conscientization pedagogy” which “emphasised the role of teachers and learners as social agents, rather than spectators of the issues which affect them, ‘domesticated’ by more powerful social forces and alienated from their critical spirit” (ibid.: 9). Janse van Rensburg (ibid.) explains the influence of Freire’s work (particularly in South America, Mexico and Africa) in developing a socially critical approach to environmental education particularly because of his involvement in drawing up the Non-Governmental Organisation’ (NGO) Forum at an international gathering which ran parallel to the 1992 United Nations Conference on Environment and Development (ibid.).

Also influenced by critical pedagogy, Fien saw democratic processes at the centre of his notion of ‘education for the environment’ (Fien, 1993). The importance of democratic processes in

environmental education teacher professional development is highlighted by Csobod speaking of a revised Hungarian curriculum which (to a large extent) enables teachers to plan, teach and evaluate their own programmes. She argues that “this greater responsibility will encourage teachers to be reflective, cooperative and to feel ownership of the teaching process. The moves to decentralise decision-making powers and increase teacher autonomy are seen as necessary steps towards a democratic society (Csobod, 2002: 100)”.

Another participation-related concern in environmental education teacher professional development is the potential for teachers to work in a cross-curricular manner (as reported by Csobod in a Hungarian teacher professional development study) for which they need “to develop collaborative skills and find ways of working with colleagues from other subjects” (2002: 103). However, in the South African context, where a ‘theme-based’ approach to curriculum work has been reported as compromising “conceptual learning and progression within subjects” (Dada et al., 2009: 24 – Section 1.3), cross-curricular teaching needs careful consideration. For example, the South African Eco-Schools programme is structured around ‘organising’ themes (Eco-Schools Programme South Africa, 2009 – Section 3.3.1). In order to maintain curriculum integrity in terms of conceptual depth and logical progression, an approach might be for different teachers to take responsibility for different projects within broad organising themes so that projects become grade and subject-specific.

These features of teacher professional development highlighting participation, dialogue and democratic processes are particularly relevant for a co-engaged approach to active learning as highlighted in Section 3.3.3. as these processes can be extended to include learners as well so that teachers, learners and community can be co-engaged in enquiries to explore local context and develop and design responses to these together. Such processes may be well-placed to support processes of ‘deep democracy’ as emphasised by Wals and Jickling (2009 – Section 3.3.3).

4.4.3 Reflexivity and development of sophistication of meaning

Janse van Rensburg highlights the importance of reflexivity which “insists that we look critically at our taken-for-granted ways of understanding the world ... this requires not merely reflection on our situation or action, but also ‘reflexivity’ – reflection on the position from which we reflect” (2000: 14). This has resonance with critical pedagogy’s vision of educators as “transformative intellectuals who should analyse their own social and cultural histories, question the contents of education and reveal the hidden curriculum” (Janse van Rensburg, 2000: 9). It also means raising the normative questions suggested by Lotz (1999) and Brown (2009) – Section 3.4 and a process of values analysis (Section 4.2.3).

Highlighting the importance of values analysis, Stevenson presents Jickling's argument for exploring values in environmental education because if complex environmental issues are reduced to purely scientific arguments "the language of sustainability may conceal ... important conflicts or contradictions in perspectives ... if it narrows the debate about ways of thinking about the environment to technical questions of what constitutes a sustainable ecosystem" (Jickling, 2002; Stevenson, 2002: 192). From a southern Africa perspective, Lotz-Sisitka, Olvitt, Gumede and Pesanayi (2006) also acknowledge conflicts and contradictions in value deliberations. They note the possibility of "ideological ambivalence and ideological blockages" and the need for practitioners to "navigate ideological blockages, where particular views on sustainable development are 'pushed' / strongly held" and to be able to highlight situations when, for example, a social justice or eco-efficiency ideology dominates discourse to the exclusion of the other (ibid.: 23).

Stevenson draws on his own earlier work to suggest that by exploring complex abstract concepts in local contexts, teachers can connect students with "complexities, nuances and controversial aspects as they are played out in local contexts" (1997 in Stevenson, 2002: 193). Wals and Jickling argue that with the "knowledge and value bases of sustainable development and sustainability [which] are variable, unstable and questionable" reflexivity is important in order to stimulate dialogue and maximise the educational potential inherent in the dissonance created from conflicting knowledge and values (2007: 13).

These skills of navigating ideological blockages and dealing with complexities are important skills for educators constructing learning programmes with a deliberative approach to active learning as exploration of issues and risk in context means that learners' experiences cannot be neatly packaged and pre-determined. The teacher needs to prepare for the unexpected and needs to be able to facilitate contradictions and uncertainties and the dialectical pull between "universal moral tendencies, and the constraints of a real world" (Shipway, 2001: 194-195 – Section 4.2.3) so that environmental learning does not lead to insecurity and inaction but a "new way of being and seeing" (Wals, 2009: 385 – Section 3.4), or becoming (Norrie, 2010 – Sections 2.4 and 2.6.2) .

4.4.4 Integration of theory and practice (praxis)

Linked to the notion of reflexivity is the notion of praxis which "constitutes deliberation on the 'why' question that illuminates meaningful resonance amidst the 'what' and 'how' of our work" (Janse van Rensburg and le Roux, 1998 in Lotz, 1999: 30). In an evaluation of the South African Gold Fields course for environmental educators, Janse van Rensburg and le Roux described praxis as "a conscious recognition of the relationship that exists between practice and its rationale(s)" (ibid.: 30).

The South African-Australian programme mentioned above worked within a praxiological framework which entailed “reflective interaction between personal professional theory, personal professional practice, and the professional settings within which these are intelligible” (Robottom & Kyburz-Graber, 2000: 255). In another case, praxis arose from the concern raised by Roy, Benayas and Pérez that “often university education is accused of being too theoretical and irrelevant to everyday concerns” and that “more efforts are necessary to get teachers and students to apply the knowledge obtained from practical projects on environmental management of the campus to environmental concerns in their particular fields” (2002: 97).

Lotz (1999) describes South African and SADC courses where praxis-oriented course assignments enable participants to take the course learning with them into their ‘real worlds’. For example she reports on Shepherd Urenje whose assignment became an “ongoing praxiological process of curriculum deliberation” as he used his assignment – which considered materials and organisational challenges – to develop a course for environmental educators in Zimbabwe (ibid.: 32).

The notion of praxis is significant in guiding work within an active learning framework as it highlights the relationship between the information dimension of the framework (the theory) and the action dimension of the framework (the practice). However, Bhaskar extends the notion of praxis as the relationship of theory in practice, to transformative praxis which he refers to as “active and reflexive engagement within the world in which we seek to achieve the unity of theory and practice in *practice*” (Bhaskar, 1993: 9, emphasis original – Section 2.6.4).

Transformative praxis can be seen in the relationship between the ‘information’ dimension and the ‘enquiry’ dimension of the active learning framework, where the enquiry encourages learners to establish how information about environmental issues, risks and concerns (theory) plays out in local contexts (practice). It can also be seen in the relationship between the ‘information’, ‘action’ and ‘reflection’ dimensions of the active learning framework where responses to environmental concerns are tried out in action and reflected upon in retrospect. Thus teachers engaged in praxis (extended to the notion of transformative praxis) through involvement in teacher professional development courses can be better placed to support more “sophisticated [active learning] approaches to mediating between the abstract and concrete, or situated activity and subject matter” as called for by Lotz-Sisitka (2009: 65 – Section 3.4).

4.5 ENVIRONMENTAL LEARNING IN THE SOUTH AFRICAN CURRICULUM

This section considers a number of curriculum challenges pertinent to environmental learning namely; ideological ambivalence, environment in the curriculum, the role of everyday knowledge in curriculum, working with ‘new’ knowledge in curricula, attaining depth of meaning and conceptual coherence in curriculum work, and assessment of environmental learning. International literature regarding these questions is also addressed with respect to these curriculum challenges, as are the implications for a situated, deliberative and co-engaged and action-oriented approach to active learning as elaborated in Sections 3.3 and 3.4.

The section reflects upon four phases in South African curriculum history: pre-1994 apartheid curriculum (considering its co-presence in the present through its historical influence), the 1997 Curriculum 2005 and the 2002 RNCS (which both had influence in the Schools and Sustainability course) and the 2012 CAPS (the current South African curriculum to which this research will hopefully have relevance (refer to Figure 1.1 for a reminder of the historical timeline).

4.5.1 Ideological ambivalence

Harley and Wedekind’s description of the mission of the new South African curriculum as that of “uniting all citizens as equals in a democratic and prosperous South Africa” (2004:195) can be related to a reaction against an apartheid curriculum agenda to “prepare different groups for dominant and subordinate positions in social, political and economic life” (ibid.: 195).

In stark contrast to the apartheid curriculum, the post-apartheid curriculum ideology of Curriculum 2005 reflected the ideals of a democratic nation concerned with equality and redress in response to past oppression. These ideals are evident in the 2009 review of Curriculum 2005 which (the review reported)

... had to:

- *Promote the new constitution*
 - *Rebuild a divided nation*
 - *Establish and promote a sense of national identity in general but particularly for a troubled education sector (17, largely race-based, education departments with several different curricula)*
 - *Be inclusive in the broad and narrow sense of the term*
 - *Offer equal educational opportunity for all*
 - *Inspire a constituency that had been oppressed by the very nature of the previous education dispensations and policies*
 - *Establish the socially valued knowledge to be transmitted to following generations.*
- (Dada et al., 2009: 11)

In the 1980s, Stevenson identified (in the United States of America) a conflict between the “ideological and political enquiry” central to environmental learning and the “dominant practices in schools, which emphasise the passive assimilation and reproduction of simplistic factual knowledge and an unproblematic ‘truth’” (1987: 69). This conflict was also evident in South Africa during the implementation of Curriculum 2005. The conflict was underpinned by a persistence of transmission and rote learning teaching methods and implied authoritarian ideologies (to which teachers had been exposed as learners in schools and as student teachers during the apartheid era), which contrasted with the democratic and rights-based ideologies presented in new curriculum policy (Chisholm, 2000). The ideological ambivalence here was created by the co-presence (Bhaskar, 1993 – Section 2.4) of past and present. That is with the co-presence of authoritarian ideologies (consistent with a performance-based model of tight control described by Taylor, 1999 – Section 4.3.1) with roots in apartheid curriculum co-existing with democratic rights-based ideologies in post-apartheid curriculum (consistent with radical competence-based curriculum models – *ibid.*).

An explicit political ideology/radical competence rights-based approach to environment in the curriculum is also evident in the RNCS and CAPS documents. This can be seen in the first principle of the RNCS which calls for an understanding of the “relationship between human rights, social justice, a healthy environment and inclusivity” (South Africa. Department of Education, 2002j: 10 – Section 1.3). A similar principle is also presented in the 2012 CAPS which calls for “human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa” (South Africa. Department of Basic Education, 2011b: 6). Constitutional rights are highlighted and endorsed in both the RNCS and the CAPS which are both committed to:

- *Heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights.*
- *Improve the quality of life of all citizens and free the potential of each person.*
- *Lay the foundations for a democratic and open society in which Government is based on the will of the people and every citizen is equally protected by law.*
- *Build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.* (South Africa. Department of Basic Education, 2011a; South Africa. Department of Education, 2002j: 7)

The rights-based ideologies made explicit in the RNCS first principle were consistent with the open-ended (and flexible – Section 4.4.1) nature of learning outcomes such as the Life Orientation learning outcome which required that: “the learner will be able to make informed decisions regarding personal, community and environmental health” (South Africa. Department of Education, 2002e: 5).

While the example above presents a consistency between the open-ended nature of the RNCS rights-based principle and the open-ended possibilities within learning outcomes, this is not necessarily

evident throughout the RNCS. Lotz-Sisitka reported ambivalence in the RNCS although this ambivalence was internal to the current curriculum policy document rather than between current and past ideologies as suggested above. She explained that the RNCS had both “generative power for social change” within the curriculum statements, as well as a newly emerging governmentality, that is, “government instituting techniques and concerns for self-government” (2005: 15). This ambivalence can be seen, for example in the Economic and Management Sciences interest in a ‘balanced economy’ which is described as “one which aims to achieve sustainable growth, reduce poverty and distribute wealth fairly, while still pursuing the principles of an open market and profitability. It promotes respect for the environment, human rights and responsibilities” (South Africa. Department of Education, 2002c: 5). This presents a clear interest in social change (reducing poverty and equality of wealth) which is considered to be possible within economic models of open markets and profitability (without question of limits to economic growth). However, this becomes problematic considering the tensions and contradictions arising between a desire for a healthy environment and economic growth, and ignoring possibilities for alternative economic models (as would be raised by a 2E interest in inconsistency and contradiction – Hartwig, 2007 – Section 2.6.2). This problematic expectation that learners can be expected to govern themselves in order to achieve the required ‘balanced economy’ resonates with the notion of the divided subject described by Dean (1999 – Section 4.2.3).

The ambivalence described above is also evident in O’Donoghue’s noting of a contradiction between “education as **resistance to modernism** and as social re-orientation **within the modernist project**” (2007: 144. my emphasis), the former which can be compared to a transformative approach to governmentality and a radical competence-based curriculum model; and the latter to a more authoritarian approach to governmentality (with emphasis on the authority of the market) and a performance-based curriculum model (Section 4.2.2 and Taylor, 1999 – Section 4.3.1).

Lotz-Sisitka elaborated on the authoritarian approach to governmentality as taken up in environmental education practices through describing a:

Paradoxical governmentality, which attempts to define, control and ‘implement’ particular forms of environmental citizenry and particular environmental education narratives [for example through] campaign-type approaches to environmental education ...; the defining of environmental education processes into standards-based frameworks and/or outcomes; and in professional development activities which structure participation in particular ways. (Lotz-Sisitka, 2004: 61-62)

This ambivalence with respect to governmentality is significant for environmental education considering how authoritarian approaches to education can be related to behaviourist/mechanical pedagogy which detracts from the importance of learning (Jickling, 1997 and Jensen and Schnack, 1997 – Section 4.2.1). The problem of the pre-determined nature of an authoritarian curriculum is evident in Stevenson’s concern that: “Whereas a curriculum in environmental education is emergent

and problematic in that the content arises as students are involved in specific environmental problems, most school curricula are predefined since they are designed to serve predetermined behaviourally specific ends”(Stevenson, 1987: 75). This raises questions for the active learning framework and highlights how it is possible for it to be used in a behaviourist way as suggested by Hoffmann (2005 – Section 3.1). However, with an interest in ‘deep democracy’ and reflexivity within a deliberative and co-engaged approach to active learning, ideological ambivalence can be embraced as an opportunity for learning and, at least, opportunities offered for a more socially critical approach to learning can be explored and elaborated on through environmental education teacher professional development courses.

The South African RNCS seeks to develop a “lifelong learner who is confident and independent, literate, numerate and multi-skilled, compassionate, with a respect for the environment and the ability to participate in society as a critical and active citizen” (South Africa. Department of Education, 2002j: 8). The transformative intent implied in the notion of ‘active and critical’ is also taken forward in the CAPS which calls for an “active and critical approach to learning, rather than rote and uncritical learning of given truths” (South Africa. Department of Basic Education, 2011b: 3 – Section 1.1) paves the way for continued exploration of a deliberative, co-engaged and transformational approach to the active learning framework in future environmental education engagement with the school curriculum. The coupling of the words ‘active’ and ‘critical’ implies an intention that curriculum interpretation should not be simply the ‘internalisation of the foundations of knowledge’ as with a progressive competence model, but one that promotes a reflexive approach emerging from a willingness and ability to “question (and break away from) existing routines, norms, values and interests” (Wals, 2007a: 38 – Section 3.4). However, this reflexivity needs to be one that does not create a divided subject (Dean, 1999: 156 – Section 4.2.3).

A significant change in the new curriculum is the rejection of the outcomes-based system by the national Minister of Education, Angie Motshekga who announced, at the release of the CAPS that “if anybody asks us if we are going to continue with OBE, we say that there is no longer OBE. We have completely done away with it” (Motshekga, 2009: no pagination). Having highlighted the positive benefits of a flexible outcomes-based system (Section 4.4.1), it becomes important to consider the implications of reduced flexibility and responsiveness in the light of the rejection of outcomes-based education and the new emphasis on prescribed and structurally sequenced content in the CAPS (Sections 1.3 and 4.5.3). This raises the question of whether a new (internally constituted) ambivalence between a transformational ideology and a transmissive pedagogy might arise in the implementation of the CAPS curriculum. Also the implications of a more rigid and structured curriculum in relation to an open-ended framework such as the active learning framework (NEEP-GET, 2004 – Section 3.2) needs to be considered.

This section has dealt with the implications of ideological underpinnings of the changing South African curriculum for active learning. The next section considers explicit reference to environmental concerns and content knowledge in this same changing curriculum context.

4.5.2 Environment in the curriculum

Section 1.3 (supported by Figure 1.1) details the history of environment in the South African curriculum with notable highlights being the call for inclusion of environmental education across the education and training system in the White Paper on Education and Training (Lotz-Sisitka & Raven, 2001: 67 – Section 1.3), the inclusion of ‘environment’ as a cross-curricular phase organiser in Curriculum 2005, and (when phase organisers were discontinued) the emphasis of the right-based approach to environment in the principle concerned with the “relationship between human rights, social justice, a healthy environment and inclusivity” in the RNCS and CAPS (Section 4.5.1).

One of the emphases in the Schools and Sustainability course was to explore, in detail, further elaborations on environment in the curriculum. This exploratory process is detailed here as it was the starting point for the lesson plans developed by the teachers participating in this study. Beyond the right-based principle discussed above, the next level of curriculum exploration was within the critical outcomes which underpinned all learning areas in the RNCS. For example, one of the critical outcomes (Critical Outcome 6) called for learners to “use science and technology effectively and critically, showing responsibility towards the environment and the health of others” (South Africa. Department of Education, 2002j: 1). Secondly, environment was embedded in the role and features of learning areas. For example, Economic and Management Sciences was concerned with “the phenomena of society’s unlimited needs and wants in the face of limited resources. At the same time it takes into account the legacy of inequity and its consequences for both the economy and South Africa’s citizens” (South Africa. Department of Education, 2002c: 4). Thirdly, environment was also evident in activity and content-based learning outcomes and assessment standards, for example, the learner “participates in a recycling project and explains how recycling contributes to environmental health” (South Africa. Department of Education, 2002e: 17) and the learner “suggests ways to improve technological products or processes to minimise negative effects on people and/or the health of the environment” (South Africa. Department of Education, 2002i: 29). Finally, environment was also evident in learning areas which identified topics in core knowledge foci (Social Sciences, Natural Sciences and Economic and Management Sciences) such as biodiversity and sustainable use of resources. Further examples of and reference to environmental integration can be found in a number of environmental education documents (Eco-Schools Programme South Africa, 2009; see also Lotz-Sisitka & Schudel, 2006; 2004; Rosenberg, 2009; Schudel, Hoffmann, Wigley, & Conde, 2008c).

Besides a continuation of the rights-based principle described above, Critical Outcome 6 of the RNCS, was reiterated in the CAPS as an aim to “use science and technology effectively and critically showing responsibility towards the environment and the health of others” (South Africa. Department of Basic Education, 2011a; South Africa. Department of Education, 2002j: 6. This reflects an ongoing concern for social-ecological issues and environmental learning in the CAPS. Environment is also evident in the CAPS in the ‘specific aims’ which sometimes re-iterate the RNCS learning outcomes and in some cases are new. For example the CAPS Life Skills subject (Grades 1 to 3) has as one of its new specific aims that learners need to develop “an understanding of the relationship between people and the environment” and “knowledge of personal health and safety” (South Africa. Department of Basic Education, 2011a: 8) instead of the learning outcome (in Life Orientation) which previously required learners to “make informed decisions regarding personal, community and environmental health” (South Africa. Department of Education, 2002e: 5).

Considering the inclusion of environment in curriculum internationally, a European example is a Hungarian project funded by the Ministry of Environment which conducted research into the "integration of waste management issues across a number of school disciplines" (Csobod, 2002: 103). Reflecting similar democratic changes to those occurring in South African at the time of the 1995 curriculum reform, Csobod reported that:

A dialectical relationship existed between the Renewal of Environmental Education initiative and the curriculum reform which was taking place at the time. Government moves towards democratic schools and support for newer pedagogical approaches motivated the teachers to participate in this new environmental education initiative. The initiative provided an opportunity (as well as freedom) for teachers to explore the implications of new active and democratic approaches at the classroom level. (ibid.: 105).

This case “highlighted the importance of giving teachers space and flexibility to make curricular and pedagogical changes. Teachers greatly appreciated the opportunity to reflect on how best to use the new materials and to be given the freedom to adapt the activities” (ibid.: 104). This case is pertinent to South Africa, because of the point highlighted in Section 4.5.1 regarding the new tightly structured and sequenced CAPS documents and how this might affect the flexibility and freedom that was clearly appreciated in this case.

On another continent, in another case of curriculum reform – in El Salvador, environmental educators lobbied for the inclusion of environmental concerns into the curriculum. Instead of working with environmental concerns across disciplines, they were limited to working with environmental concerns in the sciences. This was because “even though the Ministry [of education] was aware of the interdisciplinary nature of environmental study, adding ‘environment’ to science and health reduced its potential to be an integrative force in the schools” (Monroe, Mata, Templeton, & Douglass, 2002:

157). South African environmental educators demonstrated a similar interest in cross-curricula integration in their work with Curriculum 2005 (Section 1.3). However, with concerns raised about this approach failing to deepen knowledge and strengthen process skills in specific learning areas (Lotz-Sisitka & Raven, 2001 – Section 1.3), environmental educators moved to working with the environmental focus integral to each learning area in the RNCS (Section 1.3).

Environmental education could also perhaps benefit from Bhaskar's application of critical realism to the concept of interdisciplinarity – the “integration of the knowledges of the different disciplines” as opposed to multidisciplinary which is more of an additive approach to combining disciplines. He argues that this is necessary because of a “multiplicity of mechanisms operating at radically different levels of reality and orders of scale [which] presupposes that the systems in which the mechanisms act are open and that some of these mechanisms operate at levels which are emergent from others” (Bhaskar, 2010: 10). Epistemologically, interdisciplinarity involves empathy, understanding and creative employment of concepts, models, analogies and insights across fields and disciplines (ibid.). Bhaskar argued that disciplinary questions have implications “arguably also for secondary and even primary education” (ibid.: 11).

In primary education in South Africa interdisciplinarity does indeed have implications as Bhaskar suggests. That is because Life Orientation as one of the RNCS learning areas integrates learning outcomes from Natural Sciences, Social Sciences, Technology, Economic and Management Sciences, and Arts and Culture (Section 1.3), and as one of three subjects taught in the CAPS Foundation Phase life skills teachers are expected to use “topics ... as a means to integrate the content from the different study areas where possible and appropriate” (South Africa. Department of Basic Education, 2011a: 14).

Both in the Foundation Phase where topics and integration are emphasised; and from Grade 4 upwards where themes, topics and interdisciplinarity are not emphasised in the school curriculum; issues raised in the curriculum (such as emphasis on pollution, climate change, or biodiversity loss) can be deepened by focusing on “core concepts necessary to understand the issues, and social innovations that provide ways forward and ‘out of’ or ‘in response to’ the issues presented in the CAPS” (Lotz-Sisitka, 2011: 55). Section 4.5.3 discusses the work of South African environmental educators exploring foundational sustainability concepts **within** subjects rather than **across** subjects in a cross-curricula way.

4.5.3 'New' knowledge in the curriculum

With the introduction of Curriculum 2005 in South Africa, Sayed raised the concern that with the “shift away from a rote and transmission-oriented learning approach ... there is a risk that providers might focus only on teaching methods, and ignore the need to provide trainee teachers with the content knowledge they also require” (2004: 257). This was re-iterated by Moll’s concern with a naïve interpretation of constructivism (2002 – Section 1.3) in which group work was emphasised and in which learners were left to construct their own knowledge without teachers acknowledging the need for the mediation of new knowledge (Dada et al., 2009). This may partly be ascribed to the dichotomising of new and old curricula resulting, for example in ‘outcomes’ being favoured over ‘content’ and ‘learner-centred’ over ‘teacher-centred’ (Chisholm, 2000; Harley & Wedekind, 2004).

The challenge of content knowledge was raised in research in the Learning for Sustainability Project which reported evidence that learners were working in a knowledge vacuum due to an over-emphasis on group-work which actually distracted learners from core conceptual learning, “consolidating knowledge and developing new understandings” (Lotz-Sisitka, 2000: 108). This led to what Lotz-Sisitka described as “learner-centred emptiness” (2002: 114) exacerbated by curriculum policy where “the proper and comprehensive use of textbooks was discouraged and undermined by Curriculum 2005” (Dada et al.: 9).

An undermining of textbooks seemed to spread even to the use of other learning and teaching support materials as suggested by Lotz-Sisitka and Raven who argued that:

The emphasis on teaching without textbooks (a position put forward in the initial C2005 advocacy) seemed to deter teachers from using learning support materials, which led to the design of activities that were mostly reliant on what learners knew, or could deduce from a particular environment. (2001: 47)

Even with a re-emphasis on content knowledge in the RNCS, this curriculum revision was still criticised for knowledge that was “thin, interspersed and inconsistently presented” (Dada et al., 2009: 45). This concern is consistent with reports from environmental education research that teachers experienced difficulties with finding and contextualising relevant content knowledge (Schudel, 2010) and difficulties with their own unfamiliarity with environmental concepts new to their frame of reference (Lotz-Sisitka, 2009).

Even before the introduction of the post-apartheid curriculum, environmental education research was exploring ways of framing key concepts pertinent to environmental education. For example, research by Lotz (1996) into Foundation Phase environmental education through the *We Care* project emphasised concept formation as being a significant foundation for further environmental learning in curriculum contexts. Concepts elaborated in the project were: understanding the patterns of change,

discovering how living things fit into their surroundings, cause and consequence, conservation action to make the world a better place, interrelationships and interdependence, diversity, and place.

In another South African case, an early post-apartheid response to the environmental content knowledge challenge in South Africa was the Science and Sustainability Project based at the University of Stellenbosch which contemplated the problem of how to present ‘new’³⁰ environmental knowledge through searching for relevant principles or themes. This was during the development of the *Windows on the Wild* educational materials focusing on biodiversity in South African ecosystems. Besides biodiversity, this project identified themes related to resource use, carrying capacity of the environment, recycling, ability of the environment to self-heal, and roles played by different species in ecosystems. These were all seen as significant knowledge foci under an umbrella theme of sustainability (Schreuder, Reddy, & le Grange, 2002).

In the curriculum review which lead to the development of the CAPS, Dada et al. reported that “the intention is to streamline the curriculum documents into single documents for each grade and each subject in which content and assessment are specified” (2009: 6). Spearheading engagement with the 2012 CAPS foundational knowledge in the environmental field is the work of the Teacher Development Network (Section 1.2) which has developed two sets of teacher education materials to date which have been piloted in teacher professional development programmes. The exemplars cover climate change in the CAPS Geography curriculum (focusing on foundational concepts such as earth as a system, key life supporting processes, ecosystems functioning to support the diversity of life, and biodiversity and its role in supporting life (Vogel, 2012)) and biodiversity in the CAPS Life Sciences curriculum (focusing on foundational concepts such as ecology, classification, and biodiversity and human well-being (Shava & Schudel, 2012)).

The Teacher Development Network has identified further opportunities for environmental learning within the new CAPS curriculum in an audit that revealed that “in some subjects, up to 50% of content is ‘environmental’ or is related to ‘sustainability’; and ... environment and sustainability content permeates a wide range of subjects” (Lotz-Sisitka, 2011: 7). This highlights the possibility for drawing on research and experience from working with the ‘information’ dimension of the active learning framework which still needs to develop learners that can work with content knowledge in way that is ‘active and critical’ (Section 4.5.1).

³⁰ ‘New’ is presented here in inverted commas because environmental knowledge was not new to science at the time, but ‘new’ to the school curriculum.

As this work on environmental content knowledge continues, it will be useful to take cognisance of Rickenson's (2001) overview of environmental education research which presented a number of issues raised by other researchers, such as:

(i) use of general terms such as 'pollution' which, it is argued, can hinder students distinguishing between different pollutants and environmental problems (Boyes & Stanisstreet, 1996); (ii) abstract nouns such as 'habitat loss' in textbooks, which, due to their abstract and agentless nature, are found to have less salience for students and so can be easily overlooked (Chenhansa & Schleppegrell, 1998); (iii) schematic diagrams illustrating the greenhouse effect using arrows approaching the earth, which, according to Boyes and Stanisstreet (1996), can be misread by students as showing the greenhouse effect being caused by holes in the ozone layer allowing more solar radiation into the earth's atmosphere; (iv) studying environmentally responsible behaviours such as recycling without considering exactly how and why such practices are environmentally beneficial as this can result in 'blurred knowledge' among primary school children (Palmer, 1995). (Rickenson, 2001: 304)

The renewed emphasis on content knowledge in the CAPS reminds us of the importance of the 'information' dimension of the active learning framework and a deliberative approach to active learning, and at the same time emphasises content as an important foundation – **not** replacement – for higher order thinking skills such as critical thinking (as raised in Section 4.5.2). The question of depth of meaning is discussed in the following section.

4.5.4 Depth of meaning and conceptual coherence in curriculum work

The complexity of environmental issues is well known in environmental education work, for example, as evidenced by Galang's reflections on environmental challenges in the Philippines noting that "as environmental problems result from socio-economic, cultural and political factors in the context of the natural resources of a country, then pursuit of sustainable development must likewise address all these complex interactions" (Galang, 2002: 41). Stevenson highlights the challenge of environmental education curriculum work in that: "The complex problem solving and critical thinking involved in such inquiry demand of students considerable tolerance for ambiguity and uncertainty, autonomy for making judgments, and the confidence and insight to challenge conventional wisdom" (1987: 77).

In the context of this challenge of environmental complexity, it was a concern of environmental educators that the RNCS failed to "adequately provide the coherent, systematic content and knowledge to satisfy the specific aims of the curriculum" (Dada et al., 2009: 13). Young indicated that this can happen when learning is seen as "little more than the 'construction of meanings' or 'a conversation' – regardless of what these meanings are, what the conversations are about, or whether they give learners any reliable understanding of the world, or power over it" (2008: 191).

While the RNCS and CAPS seem very similar in terms of intention (the RNCS has learning outcomes and the CAPS has specific aims which are worded similarly – see Section 4.5.2), the two curricula are significantly different in terms of the way they are structured to work with knowledge. The RNCS expected teachers to teach towards broad learning outcomes with content knowledge that was specified in appropriate learning areas, but not dictated in terms of time frames, order and detail, thus leaving the RNCS vulnerable to poorly presented knowledge in terms of progression and depth (Dada et al., 2009: 24 – Section 1.3). On the other hand, while specific aims are highlighted in the introductory chapters of the CAPS, they have less emphasis and the curriculum is vulnerable to being undermined by an emphasis on content ‘coverage’ above an interest in the knowledge being used constructively and meaningfully in an applied and critical manner as emphasised by Young (2008) above. An argument to be developed from here is that both curricula offer opportunities for ‘good teaching’ if focus is maintained on progressive deepening of knowledge with an emphasis on how that knowledge is used to develop meaningful skills amongst learners such as critical thinking, problem-solving and creativity as emphasised in the learning outcomes/general aims respectively of each curriculum (South Africa. Department of Basic Education, 2011a; South Africa. Department of Education, 2002j). It is these three skills that have strong links to a deliberative approach to active learning as emphasised in Section 3.4 by:

- Wals’s interest in “dissonance created by introducing new knowledge, alternative values and ways of looking at the world [to] become a stimulating force for learning, **creativity** and change” (2007b: 39);
- Stevenson’s argument that problem-solving is important for “developing flexible understanding and skills for lifelong learning about complex issues” (2006: 283);
- Wals’s argument that problem-solving involving “the integration of multiple perspectives, the co-designing of viable alternatives, the utilization of diversity, and the simultaneous development of a whole range of sustainability related competences” (Wals, 2009: 385); and
- Wals’s argument for critical thinking reflected by his interest in a “systemic and reflexive way of thinking and acting with the realisation that our world is one of continuous change and ever-present uncertainty” (2007a: 37).

Research in environmental education in South Africa added further reflection on the lack of conceptual coherence emerging from curriculum work. That is, a lack of experience in working in new knowledge fields (such as biodiversity, and sustainable resource use) coupled with “information overload” from learning and teaching support materials or oversimplification of issues in an attempt to share them with learners “lead to a lack of cohesion and potential for in depth understanding” of issues (Schudel, 2006: 21). Furthermore, Lotz-Sisitka, in researching an environmental education

elective with teachers enrolled in a Rhodes University Bachelor of Education (Honours) degree, reported that teachers “had great difficulties in dealing with environmental knowledge that is contested, not certain or not available” (Lotz-Sisitka, 2011: 20). These teachers suggested that they themselves are “not adequately equipped with necessary pedagogical skills to assist their learners to engage with contested knowledge” (ibid.: 20).

One of the new CAPS curriculum principles highlights the importance of “progression [where] content and context of each grade shows progression from simple to complex” (South Africa. Department of Basic Education, 2011b: 6). This poses a challenge for environmental educators to consider how complex content knowledge should be presented. Will it be in a way that focuses on ‘internalisation’ of knowledge or the “autonomy of knowledge” (Bernstein, 1999 in Sadovnik, 1995: 11– Section 4.3.1)? Lotz calls for the latter with consideration of how to work with CAPS-based environmental knowledge “in open-ended, and innovative ways with learners, who need to develop a deep understanding of the dynamic nature of this knowledge, and its implications for society, now and in future” (2011: 28). Part of this challenge will be to ensure that depth of learning is not sacrificed for the sake of breadth so that “students know very little about many things [without] developing high-level thinking skills” (Taylor, 1999: 122).

The notion of praxis discussed in Section 4.4.4 is also significant in school curriculum work, as argued by Rosenberg who states that “the combination of practical projects with theoretical concepts is also significant for learning and the application of learning” (2009: 28). Praxis is one way of developing the high-level thinking skills mentioned above. The 2009 curriculum review also acknowledges the relationship between theory and practice as evident in the statement that “whilst projects and research develop crucial skills of retrieving information, solving problems and thinking critically and creatively, students need to have a store of knowledge on which they base their thinking. The latter is developed through learning (including memorising) content, concepts and skills for tests and examinations” (Dada et al., 2009: 34). However, the recommended restrictions to “one project per learning area per year” and for a range of “carefully scaffolded” projects to be “issued by the DoE” (Dada et al., 2009: 65) may limit environmental learning opportunities because pre-defined projects will reduce schools’ capacity to responsively choose their own issues on which to focus.

On the other hand, clearly defined environmental projects can also ensure depth and quality as textbooks and other learning support materials can be carefully developed to support a specific topic and concern. For example, one possible project is suggested in the Natural Science and Technology CAPS document (South Africa. Department of Basic Education, 2011c: 106): wetland research with a suggested enrichment in the form of a field trip. However a limitation evident in the research proposed in the curriculum is that it only highlights the importance of wetlands and problems with the

loss of wetlands (ibid.). This limitation reflects the “dominant knowledge practices ... in environment and sustainability-related teaching” described by Lotz-Sisitka as tending to be “limited by content on problems and issues for raising awareness, and [failing] to develop deeper conceptual depth and understanding of environment and sustainability” (2011: 30).

The explicit interest in the importance of wetlands (and the problems with their loss) and a wetland field trip described above lend themselves to a situated and deliberative approach to active learning. However, the failure to suggest ‘action’ or even to discuss any kind of response to identified problems is a significant absence in the curriculum which has implications for an ‘action-orientation’ to active learning and links to the concern raised by Lotz above regarding developing learners’ depth understanding of environment and responses, supported by an understanding of sustainability and “trying out” of sustainability practices (O’Donoghue and Fox, 2009 – Section 3.4).

4.5.5 Role of everyday knowledge

The importance of local relevance is highlighted in a number of international case studies. For example, in the concluding chapter of an international report of fifteen case studies of environmental education around the world, Stevenson noted that the studies indicated that while “a global perspective is critical ... learning and action must be taken at the local level [and there is a] need for authentic participation in the study of local issues” (2002: 193).

One of the challenges with the notion of ‘local action’ is highlighted in the NEEP-GET pilot research report which raised concerns that, with the imperative to do something ‘environmental’ within the curriculum framework, teachers may develop activities that only superficially respond to environmental issues and do not serve learning area requirements (Lotz-Sisitka & Raven, 2001; Schudel, 2006). Consideration of the relationship between ‘everyday’ and school knowledge can help environmental educators to address the challenge of local action without compromising the integrity of curriculum and learning requirements. For example, the South African education researcher, Taylor, notes that everyday knowledge is “crucial to defining the identity of individuals and hence to building the self-confidence of citizens who not only value their own heritage, but also respect the differences exhibited by others” (1999: 113). Relating to the concern regarding local conservatism raised in Section 3.4, he also notes that “not all everyday contexts provide suitable entry points into school knowledge. Indeed, some contexts may be misleading and even counter-productive” (ibid.: 114). He argues further that we should “use the everyday judiciously and not ... regard it as the major focus of learning (and certainly not as an end in itself)” (ibid.: 116). This is stated with the understanding that not all formal knowledge can either be derived from or has direct application in the everyday world.

With respect to everyday knowledge, the CAPS highlight the need for “grounding knowledge in local contexts, while being sensitive to global imperatives” (South Africa. Department of Basic Education, 2011b: 3). This raises the question as to whether the new curriculum will provide appropriate content knowledge support for teachers to work with this knowledge in situated ways that are not just focused on technical acquisition. It also requires cognisance of Taylor’s concern that “real world examples, even where they are appropriate illustrations of formal knowledge, [can] obscure an understanding of the logical relations which constitute the ultimate goal of school knowledge” (1999: 115).

4.5.6 Assessment of environmental learning

In South Africa, environmental educators working with Curriculum 2005 reported that teachers had difficulties with selecting and adapting activities that make appropriate links with learning outcomes and assessment standards. It appeared that teachers needed support with designing opportunities for learners to realise the knowledge, skills, attitudes and values (SKAVs) embedded in the learning outcomes and assessment standards and also have difficulty with designing assessment activities that would enable them to judge how well these SKAVs have been met (Mambinja, 2008; Ncula, 2007; Schudel, 2006). This concern is consistent with the critique of outcomes-based education from Australia that within this approach to education “curriculum and assessment descriptors ... are often vague, ambiguous, difficult to measure and low in academic content” (Donnelly, 2007: 38).

In a responsive tightening of curriculum policy, the 2009 curriculum review suggested that “outcomes be replaced with clear content, concept and skill standards and clear and concise assessment requirements” (Dada et al., 2009: 45). The resultant ‘pendulum swing’ in assessment strategy in the CAPS has an interest in knowledge which is “atomistic, explicit and measureable” (Harley and Parker, 1999: 184 – Section 4.3.1) and which Taylor used to describe a performance model of education (1999 – Section 4.3.1). This needs consideration in the light of Shipway’s concern that the positivist mechanism of standardised testing “reduces the totality of students’ knowledge to what can be (positivistically) known about students’ knowledge, thus committing the epistemic fallacy, and then in turn projects this subjective phenomenal map back out as objective data” (Shipway, 2001: 136). He explained the latter – the ontic fallacy – further in that the ontic fallacy “views knowledge as an unproblematic, direct mapping between subject and being. Just as the epistemic fallacy ignores the intransitive dimension, the ontic fallacy ignores the social aspects of knowledge” (ibid.: 64). In other words, the ontic fallacy does not allow for interpretation of how knowledge came to be. In a world acknowledged as an “open-systemic entropic totality” (Bhaskar, 1993: 50), this requires a complex assessment that allows learners to venture into the unknown and the undetermined while being sensitive to context as well as maintaining an insistence on scientifically and ethically reasoned

narrative which can develop judgemental rationality in the face of epistemological relativism (Archer et al., 1998: 11).

While the CAPS curriculum is claimed to have more structured content “in which content and assessment are specified” (Motshekga, 2010: 6 – Section 1.3), a case example of ‘natural hazards’ in the Social Science curriculum illustrates how this has resulted in a narrowing of opportunities for environmental learning. The Senior Phase Social Sciences CAPS document specifies (in Grade 7) an interest in volcanoes and earthquakes, how these occur (with emphasis on physical processes), the effects of these on humans, and rescue and relief responses. It states unequivocally that “while many of these consequences may be applied to other disasters (such as floods and hurricanes), the focus should remain on disasters caused by earthquakes and volcanoes” (South Africa. Department of Basic Education, 2011d: 27). This can be compared with specified knowledge in the RNCS Social Sciences for the Senior Phase (Grade 7) (South Africa. Department of Education, 2002h) that learners could consider, for example, drought, floods, earthquakes, volcanoes and tropical cyclones. They are expected to explain how these occur (including natural, and human-induced causes such as climate change). They are also expected to distinguish between disasters and hazard with respect to impact on people’s lives, discuss who is at risk with respect to disaster and hazard, and why some are more at risk than others. Finally they are expected to cover “management of risks and risk reduction – preventative measures (e.g. with regard to flooding, measures such as catchment management to improve the quality of rivers, vleis [marshes] and wetlands and to reduce risks to human life and ecosystems” (ibid.: 71). It is notable how the CAPS narrowing of focus has explicitly excluded many processes central to active learning such as:

- an open-ended opportunity to choose a (**situated**) hazard relevant to context (such as the RNCS interest in floods and drought which are visible at local and national level, and
- consideration of inequality and environmental justice (raised by the RNCS interest in who and why different people are affected by hazards) which ought to be central to **deliberations** in active learning, and
- consideration of the social-ecological complexities of environmental hazards (as raised by the RNCS emphasis on the ability of catchment management to reduce environmental risk and the implication that consideration of human relationships with the natural environment can prevent problems. This consideration is crucial to an **action-orientation** in active learning.

This observation calls for careful analyses of the CAPS curriculum and a consideration of how assessment and specified content may have narrowed opportunities for environmental learning.

4.6 THE ROLE OF YOUNG LEARNERS IN ACTIVE LEARNING PROCESSES

4.6.1 Young learners as rational thinkers

Considering that this study works with cases located in the foundation phase – the earliest years of formal schooling – it is necessary to consider if and/or how the considerable amount of independent and reflexive thinking required for transformative learning (described in Section 3.3.3) might be problematic for young learners. Shipway (2001) cautioned against assumptions that young learners will be able to achieve the levels of autonomy and self-determination required for emancipation. He noted that a particular (although not insurmountable) challenge for young learners is being able to realise their ideas in practice which may be attributed to a lack of one or more of the components of rational agency described in Section 2.2 (cognitive, empowered or dispositional).

However, reporting across a number of studies, Rickenson noted that research in environmental education presented evidence that “young people, including those of a primary school age, are capable of sophisticated thinking in relation to environmental issues (Strommen, 1995; Palmer et al., 1996; Bonnett & Williams, 1998; Wylie et al., 1998 in Rickenson, 2001: 305). Shipway’s further reflection may account for these findings in that he suggested that rational agency “can be possessed in degrees, as opposed to possessed or not” and highlighted the important custodial work that teachers need to do in a movement from “‘primal scream’ to ‘cognitive emancipation’” (Shipway, 2001: 198).

One way of promoting this rational agency is through working with the two-way relationship between everyday and school knowledge which “provides important pedagogical tools for inducting learners into the art of formal discourse, and for the practical application of formal knowledge to problems in the real world” (Taylor, 1999: 113 – Section 3.4, see also Section 4.5.5). Hopkins and McKeown argue further that:

It is not useful to frighten small children with global issues for which they have no control and for which they are not responsible. It is more useful to bring issues forward in locally relevant terms while seeking locally appropriate solutions. For example, the issue of nationalism can be approached in anti-racist programmes in a primary class. The issue of managing solid waste and sewage can be addressed locally in water conservation and waste management programmes. (2002: 21)

However, Taylor drew on Walkerdine’s work which argued that “familiar contexts provide essential starting points for teaching young children to reason formally, but she [Walkerdine] warns that this is by no means an easy or natural process” (Taylor, 1999: 113). Reflections on foundational competencies in the next section, begin to address some considerations with respect to the difficulties raised by Walkerdine.

4.6.2 Foundational competencies for young learners' engagement in environmental concerns

Transformative approaches to education require a considerable amount of innovation in order to respond to open-ended and complex social-ecological problems. Rosenberg argued that: “innovation is by its very nature unpredictable; it cannot be forced and it is not the inevitable result of education. But we can prepare fertile ground for innovation” (2009: 7). Thus a study in the Foundation Phase needs to look carefully at what kind of ‘fertile ground’ is needed to support young learners’ engagement with complex social-ecological questions and the skills and competences they engage (or struggle to engage) in the process. This means looking at how learners use basic literacy and numeracy foundations as well as other competencies such as creativity, and inquisitiveness, in order to engage critically with complex environmental challenges that they encounter.

A specific literacy issue significant in South Africa is the language of learning and teaching. Drawing on the South African Language in Education Policy (South Africa. Department of Education, 1997b), the Revised National Curriculum Statement recommended that “the learner’s home language should be used for learning and teaching wherever possible, ... [especially] in the Foundation Phase where children learn to read and write” (South Africa. Department of Education, 2002d: 5). In this case study, all learners had a home language of Xhosa and teaching and learning took place predominantly in Xhosa as per policy requirements. However the Progress in International Reading Literacy Study results (see Section 1.4) suggest that “children also struggle to read and write even in their home language” (Rosenberg, Nsubuga and Burt, 2009: 22).

The Revised National Curriculum Statement also stressed the importance of a carefully planned transition to the language of learning (English in the schools in this case study) during the three years of the Foundation Phase, through the introduction of English as a subject (First Additional Language) from Grade 1 (South Africa. Department of Education, 2002d: 5). However Rosenberg reported that “the standard of the English Second Language subject is said to be low, so those who start with a disadvantage because English is not their first language, will struggle to catch up” (Rosenberg et al., 2009: 23).

4.6.3 Young learners as agents of change

Based on a study of over 100 journal articles, books and reports, published between 1993 and 1999, Rickenson reported a dominance in environmental education research where:

Students... tend to be [presented as] individuals who are to be altered through educational programmes, or young people whose environmental attitudes and knowledge need to be understood in order that they can be more effectively changed through educational interventions. This is particularly marked in much of the research on

students' environmental learning outcomes, and environmental knowledge, attitudes and behavior. (Rickenson, 2001: 217)

However, he reported evidence of an emerging (though less prominent) body of research presenting a more active view of learners with, for example, the capacity to think, solve problems and influence parents (ibid.).

There are certainly voices in the environmental education field such as Hart arguing for the active participation of children in social and environmental issues. He believes that “we need children to become highly reflective, even critical participants in environmental issues in their own communities. We need them to think as well as act local while also being aware of the global issues” (Hart, 1997: 3). He continues to argue that only this way will children “develop a genuine appreciation of democracy and a sense of their own competence and responsibility to participate” (ibid.: 3).

In another example, emphasising children’s agency, the international Child-to-Child approach developed by the Canadian International Development Research Centre aimed to

... help children become agents of change in their local environment (e.g. through sanitation or tree-planting programs), with other children (e.g. by using positive health practices in sibling care), with their families (e.g. by sharing their knowledge with parents), and in their communities (e.g. through plays, participation in immunization campaigns, etc.). (International Development Research Centre, 1998: no pagination)

A local example highlighting agency amongst young learners is research by Lotz on the *We Care* project in South Africa, which pointed to “real possibilities that younger learners are able to participate in solving environmental problems, to develop critical thinking skills, to act as catalysts of change, and to become environmentally literate” (1996: 296).

4.6.4 Implications for active learning

Section 4.6.1 has implications for a deliberative approach to active learning by noting the importance of reflecting on ‘degrees’ of rational agency while highlighting that there is evidence that sophisticated thinking is possible amongst young learners in tackling complex environmental problems. The section also highlights the challenges of working meaningfully with everyday knowledge in relation to school knowledge and this is another important consideration in deliberative approaches to active learning.

Section 4.6.3 highlights foundational competencies such as literacy and numeracy that are important in supporting deliberation amongst young learners, and also highlights the need for young learners to be able to use their home language in early years of schooling. This is significant for environmental

learning considering the complexity of environmental issues and risks, thus suggesting that a situated approach to active learning would require learners to use their home language when trying to understand, report on and respond to environmental challenges.

Finally Section 4.6.3 has implications for an action-oriented approach to active learning in the emphasis of a changing view of young learners as thinkers, problem solvers and as having influence at home. The section highlights the importance of young learners participating in problem-solving and preparing for a democratic and catalytic role in society – these are skills which can be developed through an action-orientation to active learning – be it direct or indirect (Jensen and Schnack, 1997 – Section 3.3.2).

4.7 SOCIAL-ECOLOGICAL INFLUENCES ON ACTIVE LEARNING

Section 1.6 described the choice by the two rural and one peri-urban school in the study to focus on 1) the issue of nutrition in their schools, and the three urban schools to focus on 2) waste management and 3) water access and sanitation. As the final ‘contextual’ consideration in this chapter these three social-ecological issues are discussed further below.

4.7.1 Food and nutrition

Human rights commitments in South Africa uphold the international Convention on the Rights of the Child which obliges states “to care for children and to combat disease and malnutrition through, among others, the provision of adequate nutritious foods and nutritional support programmes” (South African Human Rights Commission, 2010: 51). Also, the Millennium Development Goals – endorsed by South Africa, and developed from a United Nations gathering of 189 countries in September 2000 (United Nations Development Programme - South Africa, 2012) – include the goal to “eradicate extreme poverty and hunger” with a target to “halve between 1990 and 2015, the proportion of people who suffer from hunger” (ibid.: 53). South Africa’s commitment to eradicating hunger is evident in Section 27 (1) (b) of the South African Constitution which states that “everyone has the right to have access to sufficient food and water”. This obligation is extended in Section 27 (2), according to which “the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of these rights” (South African Human Rights Commission, 2010: 51). The South African Human Rights Commission listed a number of programmes that either provide food or money to buy food to South Africans in need. Those particularly relevant in the schools that participated in this study are listed below:

- *The Department of Basic Education primary school feeding scheme, which operates at about 80% of primary schools.*

- *The Child Support Grant: for children aged 14 years and below [Section 1.6].*
- *The older persons grant: for men and women aged 60 and older [who earn below a certain annual income].(ibid.: 52)*

These programmes, however, do not always reach the people they are meant to support. A report commissioned by the 2006 Eastern Cape premier, Nosima Balindlela, provided evidence of “fraud and widespread corruption in the programme” which resulted in it being shut down only six months after its inception (George, 2007: 1). Funding inconsistencies “compromised the delivery of school feeding programmes” despite reported success of 97% of budget allocations being spent after a transfer of the responsibility of the school feeding scheme from the health to the education sector in 2004 (South African Human Rights Commission, 2010: 175).

Thus, despite these programmes and policy commitments, the South African Human Rights Commission pointed out that South African standards have “failed to adequately address issues of food security and nutrition that are of particular relevance in a context characterised with inequitable access to natural resources and variable rainfall patterns”. In addition to this, South Africa has no major assistance from the Food and Agriculture Organisation (FAO) or World Food Programme (WFP) as it is considered a “rich” developing country” (ibid.: 51).

The South African Human Rights Commission identified food security as affecting the Millennium Development Goal of achieving “universal primary education” and noted

the need for the participation of community stakeholders ... as a means to address specific issues such as food security and the safety of learners in schools... [and to] ensure that the strategies chosen to address the problems will be relevant to local needs.(South African Human Rights Commission, 2010: 166)

This concern is elaborated by the Nelson Mandela Foundation report on rural education in South Africa (2005: 41) which noted that children’s attendance at school is affected by “the absence of income, employment and food-security, [where] families have to rely on the labour of children to help make ends meet”.

The Southern African Development Community proposed a number of interventions in order to improve food security. Food gardens in schools have the potential to address three of these particularly, namely “improving food availability [through promoting] sustainable use of resources”, “improving access to food through rural non-farm income generation” and “improving nutrition” (SADC et al., 2008: 38). School permaculture gardens can promote sustainable use of resources such as through water saving and harvesting techniques, and composting techniques. Such gardens can become a site for community gardening and income generation projects. Additionally school gardens can ensure access to fresh and varied vegetables in order to improve nutritional options in the diet of

learners and community members (Food and Trees for Africa, 2011). Thus it seems fitting that school gardens were chosen as environmental projects by the three schools concerned with nutrition and a fourth school concerned with water-saving techniques (applied in the garden).

Some of the challenges that arise for starting school gardens in rural areas are land degradation and water supply as discussed in Section 1.6.

4.7.2 Waste management

The Buffalo City Municipality is constitutionally committed to comply with and implement the National Environmental Management: Waste Act which “requires that the generation of waste is avoided, or where it cannot be avoided, that it is reduced, re-used, recycled or recovered and only as a last resort treated and safely disposed of” (South Africa. National Government, 2008: 2). However, in order to promote sustainable waste management practices, the municipality is still faced with “lack of proper waste minimisation facilities” (Buffalo City Municipality, 2008: 67).

Households in the Buffalo City Municipality whose refuse was removed by local authorities at least once a week decreased from 71,3% in 2001 to 70,8% in 2007. Those relying on their own refuse dump increased in this same period from 21.7% to 23.5%, while those with no rubbish disposal system decreased from 5.0% to 3.7% (Buffalo City Municipality, 2008: 28). This decrease in the percentage of people with waste removal services can probably be attributed to a 3.1% increase in population in Buffalo City (according to a 2007 community survey conducted by statistics South Africa (ibid.: 20)) over the same time period.

In tandem with the onus on municipalities to provide “sufficient containers or places ... to contain litter that is discarded by the public” is the responsibility of individuals not to “throw, drop, deposit, spill or in any other way discard any litter into or onto ... any place to which the general public has access, except in a container or a place specifically provided for that purpose” (South Africa. National Government, 2008: 40). With the increased percentage of people relying on either their own refuse removal or having no system at all in Buffalo City, this policy highlights a tension in policy implementation that needs to be addressed.

The National Environmental Management: Waste Act includes consideration for reducing, re-using, recycling and recovery of waste in all aspects of policy including consideration for the roles of national government, provinces, municipalities and industries at the point of production. While, the initial challenge for Buffalo City appears to be waste collection in general for all sectors within its jurisdiction, the municipality is also required “as far as is reasonably possible, [to] provide containers

or receptacles for the collection of recyclable waste that are accessible to the public” (South Africa. National Government, 2008: 38).

4.7.3 Water access and sanitation

The challenges of water access to the current South African government can be traced to 1994 when it first took power. In a country with just over 40 million people, “15.2 million (12 million of whom lived in rural areas) lacked access to basic water supply and 20.5 million lacked basic sanitation” (M. Muller, 2002: 2). This is when “basic water supply is defined as 25 litres per person per day, within 200 metres of the home, and of acceptable quality [and] basic sanitation is defined as a ventilated improved pit latrine or equivalent” (ibid.: 2). In 1996, in the Eastern Cape, the province “had the lowest percentage of households with access to water (53.5%, compared with a national average of 79.8%” (Binns et al., 2001: 351).

Buffalo City reported an increased access to piped water inside homes “from 31,4% in 2001 to 47.8% in 2007” with only 2.1% still relying on rainwater, ponds, dams and other sources and the balance (50.2%) having access to water in the yard or from a point outside the yard (Buffalo City Municipality, 2008: 27). However, increased access to piped water has created other pressures. Buffalo City reported that:

Sewerage systems in the City are well beyond their design lives, are in poor condition and are operating at capacity. The effect of this situation is that expansion of the city and the housing programme is now severely constrained and the environment is under threat from sewage spills and leakages.(Buffalo City Municipality, 2008: 56)

This problem would account for an increased dependence on flush toilets with septic tanks and dry toilets in the municipality (Buffalo City Municipality, 2008).

Another concern raised by the SADC et al.(2008: 158) is that “increasing [population] pressure on water resources could negatively affect gains made in the provision of safe water and sanitation facilities”.

The problem of drinking water is a particular problem in schools. The South African Human Rights Commission stressed that:

Access to safe drinking water ensures good health and the promotion of hygiene amongst children. As most children spend five days a week at school, it is essential that they have access to an adequate supply of potable water while at school. If they do not have access to water, their right to water is not being realised along with their right to health, as illness spreads rapidly in crowded conditions. (South African Human Rights Commission, 2010: 181)

However, despite this basic need, the Commission noted that “a fifth of the schools in both the Eastern Cape and the Free State have no access to water on or near site” (ibid.: 181). Despite the reported improved access to water by the Buffalo Municipality, four of the schools in the study were reliant on rainwater tanks (two rural schools outside the municipality, one school which had problems with vandalism, and the school in the peri-urban area which had not yet received piped water).

4.7.4 Implications for active learning

The social-ecological complexities described above have implications, particularly for the ‘action’ element of active learning, as they illustrate that sustainability practices in these difficult conditions would have a number of ecological (poor soils, drought), and social (access to basic services, crime and vandalism, poverty, unemployment) challenges. This information is important when considering environmental learning processes which intend to engage teachers and learners in “transformation not only of practice, but also of the context in which practice takes place” (Janse van Rensburg, 2000: 23 – Section 4.3.5). In this respect teachers are challenged to (i) change their teaching practice to accommodate social-ecological challenges (such as developing teaching strategies to deal with crowded classroom situations), (ii) make changes to the context (such as ensuring children are properly fed), (iii) support learners to change their environmental practices (such as through making more sustainable lifestyle choices), and (iv) support learners to develop the capacity to make changes to their own contexts (such as through growing vegetables to respond to the problem of inadequate nutrition in the face of poverty and food insecurity).

All points require taking cognisance of the importance of examining the shaping influences and practical adequacy of normative frameworks (as highlighted by Lotz-Sisitka & Schudel, 2006 – Section 3.4), thus enabling a concrete Utopianism as envisaged by Bhaskar (Section 2.6.3). . They also require the teacher to be able to prepare for the unexpected and to facilitate contradictions and uncertainties and the dialectical pull between “universal moral tendencies, and the constraints of a real world” (Shipway, 2001: 194-195 – Section 4.2.3; see also Section 4.4.3) so that environmental learning does not lead to insecurity and inaction. In this way teachers and learners can work towards more sustainable ‘ways of doing’ and searching for responses in these contexts that are small and manageable, yet meaningfully related to the holistic whole.

The above points mean considering teachers’ work at two levels – firstly (related to points (i) and (ii) above) in a pastoral role as noted in Section 4.3.3 above; and secondly in a teaching and facilitation role (related to points (iii) and (iv) above) towards “the beginnings of the dialectic of desire to freedom” with students “eventually taking part in explanatory-emancipatory discourse when cognitive emancipation [realising one’s oppression] is realised” (Shipway, 2001: 200-201).

Shipway drew attention to Bhaskar's acknowledgement of different levels of emancipation so that "there is a difference between emancipatory and emancipated action, as there is a difference between the liberation of oneself and the removal of a constraint from the outside" (Bhaskar, 1993: 297). This raises the question of how much the teacher needs to change the context herself, how much she should rely on outside intervention (such as by government or non-governmental organisation), and how much she should/could support learners to make meaningful changes in their own lives. Such questions are consistent with Young's (2008: 34) emphasis on the importance "of assessing curriculum proposals in terms of balancing goals such as overcoming social exclusion and widening participation with the no less important 'cognitive interests' that are involved in knowledge production, acquisition and transmission".

4.8 CONCLUSION

This chapter raised a number of considerations relevant to a i) situated, ii) action-oriented, and iii) deliberative and co-engaged approach to active learning. These considerations arise from the context of particular educational orientations and their manifestation in teacher professional development and curriculum considerations. Other relevant considerations were the role of young learners in active learning and the complex social-ecological context in which this case study research was conducted. These considerations are summarised below and organised according to the three features of environmental learning described above.

With respect to **situated learning**, this chapter reflected on the potential within liberal approaches to education to make assumptions about certain forms of reasoning and exclude consideration of context, thus resulting in the exclusion of certain sectors of society from educational access (Giroux, 1980; Dean, 1999). It also reflected on the limitation of correspondence theory in critical approaches to educational research, which highlight hegemony but have a limited explanation of the complexity of being in terms of addressing the "contradictions and tensions that characterize the workplace and school" (Giroux, 1980).

The chapter proposed the use of critical realist notions such as laminated totality, and identification of absences, necessity, possibility and non-actualised possibility (Bhaskar, 1993; Sayer, 2000) in order to develop a more nuanced sense of 'situatedness'.

Reflecting on situated learning in the context of environmental education teacher professional development, the chapter proposed that the notion of applied competence (Jiya, Samuel, & Morrow,

2005; South Africa. Department of Higher Education and Training, 2011) and the strategy of cluster-based teacher professional development (Janse van Rensburg & Mhoney, 2000) are important considerations for developing an understanding of context in situated approaches to active learning. Another important competence highlighted in the chapter is reflexive competence which, Janse van Rensburg argues, focuses situated enquiries on “the ways in which phenomena or forms of knowledge have come about” (2000: 13). The chapter also highlighted how responsive and flexible curriculum frameworks such as those structured by ‘outcomes’ (Lotz, 1999) enable teachers to choose relevant environmental concerns on which to focus and thus ‘situate’ learning processes more effectively in terms of learner needs.

The chapter highlighted a South African curriculum interest in situated learning evident in the CAPS statement of the need to “ground knowledge in local context while being sensitive to global imperatives” (South Africa. Department of Basic Education, 2011b: 3) while warning of the need to choose everyday contexts that provide “suitable entry points into school knowledge” (Taylor, 1999: 14). With respect to young learners, the chapter highlighted the importance of the use of home language in enabling learners to engage with everyday knowledge and experiences in situated learning processes.

With respect to an **action-orientation** to active learning, the chapter distinguished between behaviourist educational approaches which have a technicist interest in developing passive learners to fill pre-defined roles versus (certain) liberal approaches with a transformative understanding of governmentality and an interest in distinguishing between empowering (Power1) and hegemonic (Power2) mechanisms in society (Bhaskar, 1993; Shipway, 2001; Ferreira, 2007) and an interest in a reflexive agent that engages in action that is “conscious, considered and targeted” (Jensen and Schnack, 1997: 165).

The chapter also highlighted a similar transformative interest in critical approaches to education – such as evident in Fien’s and Knapp’s work which calls for “skills of analysing alternative viewpoints on environmental issues, recognizing the values that underlie them, and evaluating the consequences of alternative solutions to environmental problems” (Knapp, 1983 in Fien, 1993: 63 – Section 4.2.3). At the same time the chapter warned of potential ideological imposition in critical approaches to education as is possible especially if driven by a Hegelian dialectic which is prone to proposing idealistic and unrealistic alternatives. Another important aspect of an action-orientated approach to active learning is the question of agency. This chapter highlighted agency by drawing on Archer’s interest in “processes producing educational change and stasis” (1995: 222) and suggested a critical realist ontology for understanding agency and a position-practice system for understanding the point of mediation between structure and agency.

From a teacher professional development perspective, the chapter proposed that engaging Bhaskar's dialectic can extend the notion of praxis (with an interest in the relationship between theory and practice) to the notion of transformative praxis with an interest in an "active and reflexive engagement within the world in which we seek to achieve the unity of theory and practice in *practice*" (Bhaskar, 1993: 9, emphasis original). The chapter further argues that such transformative praxis could enable teachers to mediate between "abstract and concrete, or situated activity and subject matter" (Lotz-Sisitka, 2009: 65).

From a curriculum point of view, the chapter drew on Lotz-Sisitka's perspective that knowledge practices dominant in environmental learning tend to focus on "problems and issues for raising awareness, and [failing] to develop deeper conceptual depth and understanding of environment and sustainability" (Lotz-Sisitka, 2011: 30). This concern applied to the South African curriculum reflected a reversion from possibilities for deeper conceptual depth and understanding of sustainability in the RNCS, to a CAPS emphasis on dominant knowledge practices highlighted by Lotz-Sisitka.

Such dominant knowledge practices tend to underplay a transformative intent in education. Another problem with the transformative intent in the South African curriculum was highlighted in the discussion of ideological ambivalence, as created in a curriculum emphasising an interest in both transforming society (reflecting a radical competence curriculum model) and transforming citizens to fulfill a pre-determined role in society (reflecting a performance model of curriculum) (Taylor, 1999 – Section 4.3.2). The chapter also highlighted a further contradiction in South African curriculum work which is the co-presence (Bhaskar, 1993) of authoritative apartheid ideologies (perpetuated by those trained under the apartheid system) and more radical rights-based ideology in post-apartheid curriculum development.

Reflecting on the role of young learners in a change-oriented approach to learning, the chapter argued that it is possible to prepare learners at an early age for a democratic and catalytic role in society (Lotz, 1996; Hart, 1997; International Development Research Centre, 1998).

Reflections on an action-orientation to active learning also included consideration of the implications of complex social-ecological contexts in South Africa and the Eastern Cape highlighting the role of teachers in the transformation of practice and context (Janse van Rensburg, 2003) with respect to teaching as well as in human-environment relationships. This highlighted both the pastoral and teaching and facilitation roles of teachers in action-oriented active learning processes. The chapter warned of the need to consider contextual responses that are small, manageable and meaningful in

relation to the holistic whole and highlighted the possibility in the notion of concrete universality (Bhaskar, 1993 – Section 2.6.3) for mitigation against Utopianism and inaction.

With respect to **deliberation** in different approaches to education, the chapter highlights a problem with post-structuralist acceptance of either many truths or an extremist insistence that there is no truth (Price, 2007). The chapter considers three challenges of ethical deliberations in educational contexts namely, the identification of implicit and null elements of curricula, values clarification and elaborating on the ‘nature of the good’. Drawing on notions of alethic truth (Bhaskar, 1993), a search for defensible ontological links (Shipway, 2001), processes of values clarification and values analysis (Fien, 1993; Stevenson, 2002; Jickling, 2002), moral resources (Parker, 2010), ethics-based epistemology (Cheney and Weston, 1999) and concrete universality (Bhaskar, 1993), the section suggests strategies for dealing with these different challenges. The latter strategy, concrete universality, provides particularly useful strategies in deliberative processes for avoiding local conservatism (Lotz, 1999) and a potentially divided subject when “mature and responsible use of freedom entails a domination of aspects of the self” (Dean, 1999: 156).

With respect to **co-engagement** the chapters considers how participation, dialogue and democratic processes are particularly relevant for a co-engaged approach to active learning involving teachers, learners and community. The chapter proposes that such processes may be well-placed to support processes of ‘deep democracy’ as emphasised by Wals and Jickling (2009).

With respect to deliberative active learning processes, the chapter highlighted that while the CAPS curriculum is less open for teachers to choose relevant local issues to respond to, opportunities for exploring “active and critical” learning within both the RNCS and CAPS curricula are evident. It argued that both curricula are relevant to a deliberative approach to active learning because of a common interest in critical thinking, problem solving and creativity. The chapter also highlighted the concern raised by Dada et al (2009) of the importance of a sound knowledge foundation on which such skills are dependent, thereby also addressing a concern raised by Lotz-Sisitka (2002: 114) regarding “learner-centred emptiness” in South African environmental education. Further, the chapter argued that more meaningful deliberations are dependent on a deepening understanding of issues and social innovations in response to issues (Lotz-Sisitka, 2011) and suggested emphasising interdisciplinarity across topics in the Foundation Phase curriculum as well as exploring relevant core concepts or foundational knowledge (Lotz, 1996; Schreuder, Reddy, & le Grange, 2002) across all curriculum phases.

The chapter also highlighted the importance of seeing various cognitive skills as present in degrees so that higher order thinking skills need to be carefully scaffolded for young learners. The importance of

both basic literacy and numeracy together with creativity and inquisitiveness amongst young learners were also discussed.

This is the third and final chapter in this thesis outlining significant ideas in the literature. The next chapter deals with the methodology of the study.

CHAPTER 5: METHODOLOGY

5.1 INTRODUCTION

This research has drawn extensively on the philosophy of critical realism (as outlined in Chapter 2) to inform methodological decisions. This chapter begins by relating critical realist philosophy to positivist, interpretivist, postmodern and critical social theories, followed by a discussion of the implications for the research design decisions made in this study. The critical realist concepts are also discussed in terms of their relevance for educational research more broadly. The chapter then reminds the reader of the study site and participants. This is followed by a detailed description of how seven main sources of data – document analysis, workshop observations, tutor interview, portfolio document analysis, contextual profiling questionnaires, school and classroom observations and teacher interviews, were used to generate data for the study. The analysis of this data is described in two phases, firstly a descriptive phase and secondly an explanatory phase. Finally questions of validity and ethics are discussed in the last two sections.

5.2 METHODOLOGY: POSITIONING CRITICAL REALISM IN RELATION TO DIFFERENT RESEARCH APPROACHES

The use of the term methodology in this section refers to theory of method, which includes philosophical foundations that shape the use of methods which is inclusive of aspects such as ontology and epistemology (Scott, 2000). An understanding of the nature of reality (ontology), and the nature of knowledge (epistemology) can give researchers insight into what they are looking for and how they make sense of it, hence the value of critical realism in informing research design decisions. Critical realism is based on an argument for the primacy of ontology and the inescapability of epistemological relativism. This section begins by relating questions of ontology and epistemology to positivist and interpretivist research traditions before revisiting the ontological and epistemological tenets of critical realism in more detail and considering their significance for research design decisions.

As will be elaborated in the following discussion, a number of authors explain the ability of critical realism to transcend certain limitations of both positivist and hermeneutic research (Benton & Craib, 2001; Danermark et al., 2002; Dean, Joseph, Roberts, & Wight, 2006; Sayer, 2000). Dean, Joseph, Roberts and Wight (2006) describe positivist research as “associated with a naturalism which claims the unity of method of natural and social sciences and which sees the goal of social science to be explanation taking the form of propositions concerning cause/effect relationships” (ibid.: 5). Hermeneutics represents a dualistic position which “claims a radical discontinuity between human

and non-human objects of knowledge and which sees the goal of social science, insofar as it accepts it to be possible, as understanding of interpretation” (ibid.: 5). A hermeneutic argument against positivism is based on the argument that “neither predictability nor universalisability is a possible or desirable attribute of the human world” because of humans’ individual agencies which mean that effects of societies and structures on humans can never be predicted and because humans are “necessarily marked by historico-cultural differences” (ibid.: 6). Both the object of the researcher’s gaze and the researcher herself are influenced by these differences.

Arguments against the hermeneutic stance will be returned to later in this section, and the discussion will continue to reflect on positivist projects which aim to describe the world based on empirical evidence of cause and effect (Sayer, 2000). A distinct difference between positivism and critical realism in this respect is that, while positivism searches for empirical evidence of cause and effect, critical realism searches for a description of causality in the sense of transfactuality, that is, a search for knowledge of “preconditions for an object to be what it is” (Danermark et al., 2002: 77). Transfactual conditions are expressed by abstract (and universal) concepts – such as alienation, domination, social integration, ideology, and reflexive identity (ibid.). Knowledge of these conditions is arrived at through a retroductive “thought operation involving a reconstruction of the basic conditions for anything to be what it is” (ibid.: 206). This position is encompassed by the notion of transcendental realism which “regards the objects of knowledge as the structures and mechanisms that generate phenomena; and the knowledge produced in social activity of science” (Bhaskar, 1978: 25).

Causality from a critical realist perspective claims that although objects and their mechanisms have underlying causal powers, these powers are not always exercised or triggered. Scott described this as a “generative theory of causality” rather than a positivist “successionist” theory of causality (2000: 13). This is elaborated by Archer’s (1998a: 190) description of a realist theory of science which entails a “quest for non-observable generative mechanisms whose powers may exist unexercised or be exercised unrealized, that is with variable outcomes due to the variety of intervening contingencies which cannot be subject to laboratory closure”. Thus researchers look for tendencies of objects and mechanisms to influence events, rather than a direct cause/effect relationship between objects and events (Danermark et al., 2002; Shipway, 2001). “Realists, therefore seek to identify both necessity and possibility or potential in the world – what things must go together, and what could happen, given the nature of the objects” (Sayer, 2000: 11). Put in another way, Bhaskar explained that “logic does not determine the nature of being, but at best establishes what the world must be like if we are to perform certain operations successfully” (1993: 72). This interest in necessity and possibility influences the dialectic of freedom “which goes all the way from primal scream, initiated by absence, to universal human emancipation and the perfect life, does not predict the future course of events, only the rational directionality of geo-historicity” (ibid.: 381). Dean et al. (2006: 8) express this

understanding of causality succinctly in their statement that we may speak of the tendencies of structures and mechanisms to produce predictable events or behaviours, as laws; as long as we “adopt a tendential rather than determining conception of lawfulness”.

The discussion will now return to the discussion on a hermeneutic (interpretivist) approach to social science which describes reality based on a construction of multiple meaning by different actors. Such an approach is supported by critical realism at an epistemological level by making “full allowance for the role of human agency in revealing certain processes, laws and causal properties” (Hartwig, 2007: 479). Hartwig (ibid.: 233) further explained that the hermeneutic tradition is consistent with critical realism in that it acknowledges that the “meaning of expression depends on the specific (changing) context of utterance” and the “epistemological relativity” associated with this understanding.

However, a point of disagreement comes from the judgmental relativism embedded in hermeneutics which insists that one “cannot judge between different discourses and decide that some accounts are better than others” (Sayer, 2000: 47; see also Hartwig, 2007 and Brown, 2009). This problem arises out of the assumption that people’s interpretations of reality present closure on the nature of reality and incommensurability arises “if two discourses lack a common referent [and] there is nothing for them to disagree about and no need to make a choice between them” (Sayer, 2000: 47). Sayer (2000) explained the concern within social studies for “interpretivism’s tendency to reduce social life wholly to the level of meaning, ignoring material change and what happens to people, regardless of their understandings”. This critique is encapsulated by Bhaskar’s notion of the ‘epistemic fallacy’ which: “is the analysis, definition or explication of statements about being in terms of statements about our knowledge of being, the reduction of ontology to epistemology” (1993: 4). This subjectivising of reality fails to “locate thought within a non-ideational and mediated reality encompassing it” (ibid.: 10).

A further consistency between hermeneutics and critical realism, is hermeneutic’s interest in the context in which meaning-making occurs. Bhaskar’s dialectical work particularly embraces the hermeneutic circle whereby “the parts cannot be understood unless there is some prior understanding of the whole, and vice versa” (Hartwig, 2007: 234). The hermeneutic circle is evident in Bhaskar’s notion of dialectical totality³¹ which he described as:

When separated phenomena come to be seen as aspects of a unified (or disunified) whole. Hermeneutics provides a good initial heuristic for understanding what it is to think in this dialectical mode. In a painting it is not only that the parts cannot be understood except in relation to the whole and vice versa but — and this is the clue to Hegelian totality — they mutually ‘infect’ each other. (Bhaskar, 1993: 12)

Bhaskar’s (1998a) notion of the ‘real’ illustrated a way of describing both a reality outside of the knowing subject while at the same time acknowledging the importance (and causality) of human

³¹This notion of totality is elaborated in the Bhaskarian MELD schema (Section 2.6.3).

consciousness and language, thus posing “a solution to the conflict between positivism and hermeneutics [in the form of] *critical naturalism*” (Shipway, 2001: 52). His reality depends on the notion of ‘stratification’ described in terms of the existence of **events** which are independent of **experiences** of these events, and **mechanisms** which exist independently of events and actions of humans that have access to them (see Table 5.1).

Table 5.1 Stratified reality (Bhaskar, 1998a: 41)

	Domain of real	Domain of actual	Domain of empirical
Mechanisms	√		
Events	√	√	
Experiences	√	√	√

Danermark et al. (2002: 20) described the empirical as: “what we experience, directly or indirectly” and which “contains our ‘data’ or ‘facts’”. They described the actual domain as incorporating experiences as well as events which “happen whether we experience them or not (what happens in the world is not the same as that which is observed)”. Both positivist and interpretivist research projects would be positioned in the domain of the empirical – based respectively on sense-experience and multiple interpretations of how they were experienced (whether those are appropriate interpretations or not). Danermark et al. highlighted the different elements of the domain of the real through their explanation that “reality has powers and mechanisms which we cannot observe but which we can experience *indirectly* by their ability to cause – to make things happen in the world” (ibid.: 20).

Critical realism can also be positioned in relation to postmodernism. Contrary to postmodernist tradition (and an interpretivist tradition), the critical realist approach insists that reliable knowledge claims (explanations based on patterns) can be made; however these cannot be achieved by a process of induction where “generalization is an extrapolation. Knowledge of a limited amount of events is extrapolated to, and is assumed to be valid for, a larger population” (Danermark et al., 2002: 76). But, as critical realists contend, no predictions can be made of a society which is open-ended, contingent and contextually dependent. Bhaskar argued that “there are no explanatory significant empirical regularities yielded by social science, so the social domain is *de facto* open” (1993: 156). Archer elaborated in arguing that social systems are both extrinsically and intrinsically open. This means that it is impossible to attempt to definitively describe society even with the proviso of excluding external influences because systems are peopled by creative and innovative agents whose reflexivity will ensure constant engagement in thought experiments and constantly changing practice (Archer, 1998a). A similar vision of the open-endedness of society is also shared in postmodernist research but the open-endedness can be seen in a more pessimistic light – namely absence of certainty, regularity and

closure so that reliable knowledge claims are not an expected outcome of postmodernist research (Sayer, 2000). Thus postmodernist theory is susceptible to the same critique of judgmental relativism as is the hermeneutic tradition. However, in the critical realist tradition, reliable knowledge claims are considered essential, and possible in an open-ended and changing world. This is explained by Bhaskar as follows:

In an open world any particular prediction may be defeated, so transcendental realism allows us to sustain the transfactuality (universality) of laws in spite of the complexity and differentiation of the world, e.g. so as to enable us to infer the mediated efficacy of tendencies in extra-experimental contexts. (Bhaskar, 1993: 35)

The possibility of reliable knowledge claims is further elaborated by Shipway who draws on Bhaskar to explain that:

Although they [laws based on knowledge claims] are reliable, they are not of the sort which are never 'broken'. The replicability of natural laws is a result of the enduring powers and the tendencies of the object. As a result, natural laws are to be viewed [not as] empirical statements, but 'statements about the forms of activity characteristic of the things of the world'. (Shipway, 2001)

Bhaskar's critical realist ontology highlights the open-ended nature of social systems, particularly the spatio-temporal and causal complexities of the four-planar model of social being (1993 – Section 2.4). In this context, "explanatory power becomes the chief criterion of adequacy of theories in social science, as opposed to prediction and control for the theories of natural science" (Shipway, 2001: 59). This question of 'explanatory power' is one of the key validity considerations in critical realist research. Validity is discussed further in Section 5.8.

Critical social sciences cover a very wide spectrum, thus making it difficult to compare this broad research agenda with critical realism (with a similar wide spectrum of approaches), however an obvious similarity between the two is their shared interest in change with an emancipatory interest. Archer's call for considering theory/practice relationships in the generation of practical social theories from research conveys a change interest in social sciences:

Social theory has to be useful and useable: it is not an end in itself. The vexatious fact of society has to be tackled in theory and for practice. These two tasks cannot be separated, for were practical utility to be the sole criterion we would commit ourselves to instrumentalism – to working with theoretically ungrounded rule of thumb. Conversely, a purely theoretical taming of the vexing beast may give a warm inner glow of ontological rectitude but is cold comfort to practical social analysts. (1998b: 356)

Further, the social agenda of critical realism is emancipation, defined as the move from "unneeded, unwanted, and oppressive to needed, wanted and empowering sources of determination" (Bhaskar, 1989: 6). Bhaskar argued for this emancipatory interest by explaining that any ill (whether an absence or transposed as one as explained in Section 2.3) will impose oppressive constraints and inequities. He then reasoned that "inasmuch as they are (i) *unwanted*, (ii) *unnecessary* and (iii) *remediable* or

removable, they should be transformatively negated, i.e. absented” (1993: 259-260). Bhaskar captures this interest more simply as moving from ‘is’ to ‘ought’ or from fact to value. Fundamental to describing and enabling this emancipatory interest is an explanatory critique which Hartwig (2007: 196) described as “critique of a phenomenon that follows from diagnosing that it is part of the explanation of why a false belief is held (cognitive explanatory critique), or why some social or personal ill persists (needs-based explanatory critique)”.

Bhaskar’s concept of critique incorporates the Hegelian/Marxian notion of “immanent critique ... which identifies either theory-practice inconsistencies or aporiai [difficulties, wants, losses, needs] together with their source” (Hartwig, 2007: 107). However (and this is where differences with earlier work in the critical social sciences comes to the fore), for Bhaskar, the limitations of immanent critique lie in that “locally and globally theory/practice inconsistency or incoherence is always for Hegel resolved in thought, in theory so that its negation “entirely lacks determinacy, and any sort of depth” (Bhaskar, 1993: 8 – Section 2.3). The practice therefore remains. Transformative negation is confined to thought” and therefore creates “transfiguration of actuality in the post-philosophical reconciliation” (Bhaskar, 1993: 26). As an alternative to the idealism inherent to the Hegelian dialectic, Bhaskar proposes concrete utopianism which “involves thinking about how a situation of the world could be otherwise, with a change in the use of a given set of resources or with a different way of acting subject to certain constraints” (Bhaskar, 2010: 22 – Section 2.6.3). As discussed in Section 1.7, a critical realist ontology “makes it possible to understand how we could be or become many things which currently we are not” (Sayer, 2000: 12) thus grounding alternative ideas in real possibility. This is also a concern of feminist researchers such as Pendlebury who insisted that:

Epistemic communities that are worth sustaining through education should be both reliable and habitable. I take these as normative criteria. If the collective wisdom and standard procedures of an epistemic community lead us to act in ways that are self-defeating through illusion, ignorance, false beliefs or sheer pig-headedness about what is possible and what is not, they are not worth sustaining. (1998: 59)

The theory/practice inconsistency or incoherence to which the Hegelian dialectic is prone, can be traced to a tendency in early critical social science work to make assumptions about how the world ought to be without acknowledging the contentiousness around normative questions – normative statements affirm how things should or ought to be, how to value them, which things are good or bad, which actions are right or wrong. Sayer highlighted critical realism’s problem with critical social science in which “ought follows straightforwardly from is, apparently bypassing difficult normative issues which elsewhere are the subject of interminable debate” (2000: 158). In contrast, Sayer argued that critical realism encourages reflexivity around critiques of society as well the “desirability and feasibility of the alternatives they imply” (ibid: 159). Sayer (ibid.: 159) argues that this focus on normative questions is one of the big challenges for critical realism because of the “enormous

difficulty of deciding on the nature of the good: what are the false beliefs and frustrated needs here”? The discussion on ethics in Section 4.2.3 highlights the work of critical realists addressing this challenge as is evident in Price’s view of altruism in the light of humans and non-humans connected in “an intimate web of relating” (2007: 250) and Bhaskar and Parker’s argument for a “new immanent humanist ethic that is capable of sustaining a continuing commitment to human emancipation and self-realization, rather than just mere survival” (Bhaskar & Parker, 2010: xii).

In essence this section outlines a critical realist approach to research as a search for transfactual causality in which the exercise of powers and tendencies of generative mechanisms are contingent on different structural and social relations in an open-ended society. The search identifies situations of necessity and possibility on which a rational judgement or imperative can be made, accompanied by a reflexive consideration of normative assumptions in society. The implications of critical realist underpinnings for case study research, and educational research and environmental education research, are reflected in the next two sections respectively.

5.3 CASE STUDY RESEARCH

Sayer explains how specific social contexts are always dependent on an “intrinsic condition” – that is interpretation and implementation by actors in open systems (Sayer, 2000: 22). Bhaskar’s definition of the intrinsic aspect of a situation is “intentional aspect of agency” (1993: 400). This is consistent with case study research as focused on “understanding the peculiarities of [a] particular situation or event” (Stark & Torrance, 2005: 33). Stark and Torrance elaborate that “case study seeks to engage with and report the complexity of social activity in order to represent the meanings that individual social actors bring to those settings and manufacture in them” (ibid.: 33). To case study research, critical realism can bring an understanding that the “outcomes of the activation of mechanisms [such as a rights-based curriculum] always depends on specific contexts”. The condition then intrinsic to a particular case is how these mechanisms “work through actors’ perceptions and choices, and whether people respond appropriately depends on many possible circumstances which are likely to vary within and between cases, and which researchers should try to identify” (Sayer, 2000: 23).

Dressman explains that case studies “avoid questions of the applicability of findings to other settings by denying generalisability” (2008: 60). This is consistent with Stark and Torrance’s statement that it is “not possible to generalise statistically from one or a small number of cases to the population as a whole” (2005: 33), but other interpretations of generalisability, particularly as they pertain to a critical realism application in research, are discussed further in this section. Dressman raises a concern focused on the assumption that “differences within populations and settings are far more salient and

significant than any generalities that may be discerned” (2008: 60). Interpreted in this way, case studies could be exposed to the charge that they are “little more than self-indulgent and solipsistic processes whose ultimate consequence may likely be the reproduction of the status quo” (ibid.: 61). However, Stark and Torrance present a more critical role for case studies which would not lend itself to this potential pitfall, when they argued that case studies “aspire to tell-it-like-it-is from the participants’ point of view, as well as hold policy to account in terms of the complex realities of implementation and the unintended consequences of policy in action” (2005: 33). Important to a critical understanding of phenomena is a need for case studies “to pay attention to the social and historical context of action, as well as the action itself” (ibid.: 34).

With a critical realist understanding of society as emergent (see Section 2.4), open-ended and contingent (as discussed above in Section 5.2) it would be necessary to acknowledge that any number of different events and actions might arise out of similar contexts. This means that one would not expect to be able to generalise to the point of predicting future events and actions or claiming that all similar contexts would produce the same events and actions. Yet critical realism encourages us to determine the “necessary and constitutive properties in different objects, this determining the nature of the object ... The abstractions must, however, at any given point in time, separate the object's necessary properties from the contingent ones and show what it is in the object that makes it what it is and not something else” (Danermark et al., 2002: 44). It is the constitutive properties together with their causal powers and tendencies which would constitute the generalising nature of a critical realist study. This means a dependence on abductive forms of inference in which we infer “to the best explanation. In this type of reasoning, the justification of a generalization relies on the fact that it explains the observed empirical data and no other alternative hypothesis offers a better explanation of what has been observed” (Evers & Wu, 2007: 200).

This requires understanding the generative mechanisms, together with the contingencies to which they are subjected, so that one might be able to better understand the “complex realities of implementation” mentioned by Stark and Torrance. Applying a critical realist approach to case study research would ensure knowing these complex realities; but also understanding of what drives societal actions in a certain direction. This would enable the move from fact to value as described above and would enable Stark and Torrance’s call to “hold policy to account” – and indeed any other social structures or actions with Power2 influences on society.

A critical realist approach would only partly be in agreement with Stark and Torrance’s assertion that “it [case study research] assumes that things may not be as they seem and privileges in-depth inquiry over coverage: understanding ‘the case’ rather than generalising to a population at large” (2005: 33). Yes, a stratified view of reality arguing that reality is more than the empirical and the actual

would support the assertion that “things may not be as they seem”. However it is important not to see in-depth enquiry and generalisability as mutually exclusive as implied by Stark and Torrance. In fact one would need [ontological] ‘depth’ understanding in order to arrive at an explanation of society based on generative mechanisms that can be said to have generic influence on society, thus generalisability that occurs at the level of the generative mechanism as noted above.

The above discussion implies that there is no single way to do case study research and one’s approach would depend on one’s intended purpose and philosophical under-labouring of the case study design. Stake (2000) described three types of case studies, namely intrinsic, instrumental and collective. An intrinsic study is defined as one where researchers have a greater interest in describing the specific case and less on determining generalisations. The value of such a case study would be to individuals who might “recognise aspects of their own experience in the case and intuitively generalise from the case” (Stark & Torrance, 2005: 34). An instrumental study has a purpose of providing insight into an issue in order to test or develop a theory (Stake, 2000). A collective study is one used to generalise and construct theories and is a product of several instrumental studies (Stark & Torrance, 2005). This research is instrumentalist in the sense that it sets out to explore the change orientation of active learning towards theorising what enables and constrains that change orientation. However, it is also intrinsic or explanatory in the sense that it provides explanatory critique of these change oriented active learning processes and their constitution from a critical realist perspective. Generalisations made are of generative mechanisms common to the cases of six teachers participating in the Schools and Sustainability Course. This element of the research thus also categorises it as a collective study. This collective approach makes it possible to “compare and contrast across cases ... and investigate the range of possible experience within a programme” (ibid.: 34). The research could also be described as a nested case study which Lotz-Sisitka and Raven refer to as: “situating of a range of different case studies within a broader case” (2004: 72). In this case there are six case studies of course implementation in school and classroom situations (analysed broadly in terms of the pedagogy of active learning in Chapter 7) within the broader case of the Schools and Sustainability Course (analysed broadly in terms of teacher professional development in Chapter 6). Broader generative mechanisms shape all cases contained in the Schools and Sustainability course case.

Section 2.1 introduced the value of philosophy to research design decisions in terms of underpinning ethical and social principles, the claims that we can make on knowledge of these objects, and the methods of enquiry that we employ. Sections 5.2 and 5.3 have argued for an emancipatory goal for research (ethical principles), the generalisability of knowledge claims in terms of their constitutive properties, and causal powers and tendencies; rather than their being representative of other groups or places outside of the case being studied (social principles); and the ability to argue from fact to value

(claims on knowledge). Section 5.4 will consider the relevance of critical realism specifically in educational and environmental education research.

5.4 CRITICAL REALISM IN EDUCATIONAL AND ENVIRONMENTAL EDUCATION RESEARCH

Section 4.3.4 points out that we not only need to consider how much time teachers spend in the classroom but also the effectiveness of whatever teaching takes place. This is clearly a pertinent question, but effectiveness is a notion that can be limiting if used in purely positivist ways, for example in the standardised testing described in Sections 1.4 and 4.5.6. While standardised testing may be an important opening discussion in large scale national research and for international comparisons, Scott raised the point that we need to take a critical stance on the notion of effectiveness in this sense by asking whether both our ends (such as learning outcomes with an economic rationalist justification) and means (such as a reductionist end-oriented process) are justifiable, thus seeing research as an “ideological or value-laden enterprise” (2000: 66). This not only adds a normative element to the “effectiveness” debate but also to other elements of quality in a broader sense including efficiency (input versus output), equality and relevance (dealing with issues such as improving livelihoods, access and achievement at primary level and amongst disadvantaged groups at secondary level) (Barrett, Chawla-Duggan, Lowe, Nikel, & Ukpo, 2006).

The importance of normative questions (Section 5.2) is also highlighted in South African educational research, and is evident in Muller’s call for the social responsibility and public accountability of researchers (1999). The value of normative questions when applying critical realism in environmental education research is illustrated through Lotz-Sisitka and Schudel’s (2006) reflection on the normative principle in the South African curriculum expecting learners to understand the relationship between human rights, social justice, environmental health and inclusivity and Price’s (2007: ii) reflection on how philosophical mistakes “function to buttress ideology and its attendant contradictions which in turn function to provide the preconditions that maintain inequalities and poor environmental practice in business and industry”. The value of normative questions is particularly pertinent in the field of environmental education which emphasises:

Aspects of learning that enhance the transition towards sustainability including citizenship education; education for a culture of peace; gender equality and respect for human rights; health education; population education; education for protecting and managing natural resources; and education for sustainable consumption. (Lotz-Sisitka & Lupele, 2012: 20)

Questions of social justice are infused in many of these different approaches to environmental education, for example, the notion of global citizenship was conceptualised by Oxfam as an “ethical

standpoint based on both local and global mutuality in relation to basic rights, social justice and environmental justice” (Wade, 2008: 12).

Evident in a number of the approaches listed above is acknowledgement of the relationship between environment and society or the biophysical environment and society (Section 1.6) or ‘nature’ and society. This is emphasised by the Millennium Ecosystem Assessment project which states that:

Everyone in the world depends completely on Earth’s ecosystems and the services they provide, such as food, water, disease management, climate regulation, spiritual fulfillment, and aesthetic enjoyment. Over the past 50 years, humans have changed these ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. (Millennium Ecosystem Assessment, 2005: xi)

This is particularly pertinent in Africa where “almost 75% of people in southern Africa depend on the environment and biophysical life-support systems for their livelihoods” (Lotz-Sisitka, 2004: 65).

Critical realist research helps researchers in the environmental and environmental education fields to understand how social systems emerge from natural systems and, as explained by Parker, that “whilst human social structures may be dependent upon the structures of living systems, they can, at the same time, destroy those living structures” (2008: 38); or, through active learning processes, these structures can be changed through a process of morphogenesis (Archer, 1998b) where agents protect, work with, or restore these natural systems.

Also critical realism’s acknowledgement of the open-endedness of social systems is important. For example a critical realist perspective would support the criticisms raised by Scott of school effectiveness research that assume a closed-system link between family background and progress, with “school effectiveness” as the key variable that might change this relationship (Scott, 2000: 64). In applying critical realism to this problem we need to see curriculum policy as a process where “a set of policies is conveyed along [a] chain and implemented, it is better thought of as a fractured, dislocated, only occasionally exhibiting a linear form” (Scott, 2000: 76). We also need to be conscious of Power1 and Power2 relations (see Section 2.5) which are “infused in every human deliberation” that influences this chain (ibid.: 76) and the context in which policy is applied, especially considering that “the actual and anticipated contexts of policy-making are always in a state of flux” (ibid.: 77). This view of policy allows us to critique two differing views of curriculum, the first being a structuralist view which denies the power of the agent in assuming that they are victims of a “hidden psychological mechanism” designed to “further the interests of capital” (which can be related to a behaviourist/technicist approach to education and a “modernist ideal of engineering society through education” (Price, 2007 – Section 4.2.1)); and the second, a pluralist view of curriculum “where the policy process is understood as driven by diversity” and thus representative of

all sectors/members of society without considering the power relations influencing patterns of inclusion and exclusion (ibid.: 77) (see also “authoritarian governmentality” – Dean, 1999: 155 – Section 4.2.1). In the context of environmental education research, the open-endedness of human-environment relationships lends itself to critical realist research. With environmental issues potentially seen as a mesh of interrelated complexities, dialectical critical realism offers the language and tools to understand the lamination of totality at 1M which is “constituted by several ontologically distinct but interacting mechanisms” (Section 2.6.1).

Critical realist research in education extends positivist research – limited by a description of events based on controlled experiments (detailed, for example, by the degree of absence of teachers from the classroom) – to include a search for underlying mechanisms in open systems that influence this absence (detailed, for example, by descriptions of socio-economic conditions, systemic inefficiency or expanded roles of teachers which distract them from classroom activities). In an example related directly to human-environment relationships, critical realism can help researchers to understand ills and absences such as food insecurity in terms of mechanisms such as policy, inefficiency of government structures to meet policy requirements, and severe ecological limitations such as drought. In other words: “critical realism claims that more, rather than less, skepticism should be ascribed to such data [obtained from controlled experiments] ... The knowledge gained from such empirical studies needs to be balanced with, rather than placed in opposition to, the contextual aspects of education” (Shipway, 2001: 164).

These reflections on case study research applied to this particular study, mean that there are particular generative mechanisms common to teacher professional development in South Africa, such as a history of apartheid segregation and Power2 relations, a (changing) curriculum and teacher education policy, and a context of poverty (Sections 1.4 and 4.3) – equally pertinent to rich and poor, particularly because of the levels of inequality in South Africa and Bhaskar’s vision of eudaimonia in which “the free flourishing of each is a condition of the free flourishing of all” (Hartwig, 2007: 157 – Section 2.2). Mechanisms common to environmental education nationally and internationally are an interest in active learning (Sections 3.3 and 3.4 respectively) and a spiral approach to teacher professional development in environmental education teacher professional development in South Africa (Section 1.5). Within the particular school cases are intrinsic interpretations of curriculum and the role of schools in transformative praxis, all influenced by particular contingencies and particular spatio-temporal manifestations of the broader generative mechanisms.

5.5 STUDY SITE AND PARTICIPANTS

As introduced in Sections 1.1 and 5.3, this research is constituted as a critical realist case study of the Schools and Sustainability Course, and the active learning processes that emerged in classrooms and practices of six teachers participating in the course.

The course entailed three two-day regional Border Kei workshops, and a minimum of three district workshops (in each of King Williams Town, East London and Butterworth districts). There were a total of seventeen schools and twenty-three teachers participating in the 2008 course. I ran the regional workshops and the district workshops were run by tutors. In between regional workshops, teachers worked on lesson plans with the support of district tutors.

This research is a nested case study of the course and of six teachers in the King Williams Town and East London districts. The six teachers were all participants in the 2008 course, and were approached to be participants on a volunteer basis. The fact that twenty-one out of twenty-three teachers volunteered to participate in this research could be attested to the fact that as research participants they benefitted with personal visits and advice from me as the researcher and course co-ordinator (otherwise they also had the benefit of visits from their local tutor). Initially eight of these twenty-one teachers from the East London and King Williams Town localities were chosen due to ease of access (Butterworth teachers were a long drive away), but two of these left the course after the first module. Sections 1.6 and 4.7 discussed the context of the two rural, one peri-urban and three urban communities in which the final participating schools were situated, detailing the socio-economic context and the challenges with regard to nutrition, waste management and water access and sanitation.

The context of the six teachers and their practices are briefly introduced here, but are elaborated further in Chapter 7. Because the focus of the research was not on tutors, tutors' names are not identified in transcriptions of discussions. Tutors are simply named Tutor 1, Tutor 2, and so on according to order of appearance in the transcript. This has largely created the impression of a homogenous group of tutors in the thesis. A homogenous group, of course, is not possible, but in this study not enough data was gathered to deepen the study through distinguishing tutors. The introduction to the teachers below makes use of the real names of the first five teachers. The sixth teacher (Zodwa) has been given a pseudonym due to reasons discussed in Section 5.9.

Nokhanyo Vimbi taught in a township situated 7km outside of King Williams Town. Concerned with the burning of waste in her school that was otherwise strewn about by wind and animals, she instigated learning activities focusing on waste reduction, particularly recycling and re-use. Similarly, **Weliwe Gcaza**, teaching in the township of Mdantsane also focused on waste and waste reduction.

Nomonde Mvemve, teaching in a small rural village outside of a small rural town by the name of Peddie, **Nomhle Stoto**, teaching in a small rural village outside Stutterheim, and **Mhizana Maqelane**, teaching in the peri-urban area on the outskirts of East London, were concerned with food insecurity in their schools and communities and all decided to focus on learning activities linked to the development or extension of food gardens in their schools. **Zodwa Gxasheka**, teaching in an informal settlement of Mdantsane on the edge of the East London township, was concerned with vandalism and poor quality water and sanitation infrastructure in her school and resultant health problems associated with water wastage and access as well as inadequate sanitation facilities in the school. She embarked on learning activities centred on a water saving campaign coupled with a community intervention regarding the identified water and sanitation problems.

5.6 DATA GENERATION METHODS

Data generated between 2008 and 2011 constitutes the case record on which this research is based. The bulk of the data was generated during the course in 2008 as described in Section 1.1 while additional interviews and informal interviews were conducted between 2009 and 2011 to supplement the 2008 case record.

Data was generated for two particular aspects of this study. The first was an exploration of the course history, design and implementation. This included a document analysis of influential courses and programmes and of orientation activities in teacher portfolios, observations of one district workshop and three regional workshops, and an interview with a course tutor. This data formed the basis for Chapter 6 of the thesis. The second aspect of the study was the school projects and lesson plan development and implementation that the teachers engaged in for assessment purposes. The data generated in order to understand these processes included contextual profiles of school and community and of teacher and classroom (based on questionnaires); observations of school and classroom practice; interviews with teachers; and document analysis of lesson plans, learning and teaching support materials, assessment tools and learners' work from teacher portfolios. This data formed the basis for Chapter 7 of this study.

All data was either uploaded or typed directly into the qualitative data analysis programme – NVivo. NVivo served both to store data and to assist with processing of data during the analysis phase (Section 5.7).

The data generation methods are detailed below.

5.6.1 Document analysis

Stark and Torrance (2005: 35) explained the value of document analysis for examining change over time. This was the purpose of analysing the list of documents which are presented in Appendix A with detail rationalising their choice provided in Section 6.3.1. These nineteen documents were used for analysing influences on the Schools and Sustainability Course from the earliest influence – the Learning for Sustainability Project in 2000 to the 2007 Schools and Sustainability course materials which were used unchanged in 2008. The list includes reports and research reports from the Learning for Sustainability Programme, the National Environmental Education Programme (which ran concurrent to prototype Schools and Sustainability courses) and the Eco-Schools - South Africa programme. It also includes reports, evaluations and course orientation texts from different versions of the developing Schools and Sustainability course since 2002. All reports and evaluations available were analysed, but only course orientations from 2004, 2005 and 2007 were analysed as these years represented significant reworks of the course. The 2002/2003 prototype course content was reviewed from a programme document which summarised the course activities. This analysis is presented in Section 6.3 and the documents are referred to as Doc[assigned number] (see Appendix A for assigned document numbers).

5.6.2 Workshop observations

The three regional workshops described in Section 1.1 were all recorded where possible through:

- a) Capturing of workshop notes (WN1) after regional workshop 1 and capturing of flipchart notes from regional workshop 3 (WN2).
- b) Audio recordings of discussions amongst the whole group or audio recordings of breakaway groups. There were usually four breakaway group discussions happening concurrently so, with only one digital recorder, not all discussions were captured. However the rich discussions presented in Appendix B illustrate that a significant and sufficient amount of data was generated. The audio recordings from the three workshops were transcribed and are referred to as RW1, RW2 and RW3 respectively in the thesis. Because many people were speaking during these interviews, the speaker names in the transcripts were generically identified as Teacher 1, Teacher 2, etcetera; and Tutor 1, Tutor 2 etcetera.

Time constraints only allowed one district workshop visit. This was a visit to the Department of Education King Williams town offices. Notes were taken and later typed up into a document (DW1) (see Appendix C).

Both regional and district workshops provided evidence of teachers deliberating course tasks and the detail and practicalities of realising environmental learning opportunities in their particular contexts. The data from these workshops was analysed with other data and presented as part of the ‘Course interactions and deliberations’ in Section 6.4.

5.6.3 Tutor interview

One unstructured interview was conducted with the King Williams Town tutor, Nomsa Nxinga at a midpoint in the implementation of the course. This interview provided insight into the implementation challenges particularly with respect to curriculum management, learning and teaching materials, whole school development and project practicalities. The interview was audio recorded, transcribed and is referred to as TutI1 in the thesis (see Appendix D for evidence of the transcript). The analysed data from this interview was used towards constructing Section 6.4 of the thesis – ‘Course interactions and deliberations’.

5.6.4 Portfolio document analysis

Teacher portfolios were the second set of documents analysed. Teacher portfolios were divided into two sections for analysis, the first contributing to Chapter 6 and the second to Chapter 7 of the thesis:

- a) The portfolio sections with completed activities in workbook-format (including reflections) on each of three course learning units, were presented in Chapter 6. Extracts from these activities were recorded directly as internal NVivo documents; that is, they were typed up directly into NVivo. These sections are referred to in the thesis as Port[teacher initials]-LU1, Port[teacher initials]-LU2, and Port[teacher initials]-LU3 for each teacher respectively. Appendix E illustrates one of these portfolio extracts. The purpose of analysing these sections was to see the planning (through curriculum and contextual engagement) of classroom work and to understand teachers’ reasoning behind their decisions, and to use teacher reflections to get a sense of teachers’ successes, challenges and concerns after lesson plan implementation. After a first phase analysis, this data was used towards the narration of course implementation presented in Section 6.4 of the thesis.
- b) The portfolio sections with lesson plans – including learning and teaching support materials, learners’ work and assessment tools – were used to present curriculum requirements selected by teachers and to describe classroom activities. These descriptions include inserted photographs and scanned copies of learning and teaching support materials, learners’ work and assessment tools. Translation from Xhosa to English was conducted by a first language Xhosa speaker and checked for accuracy by another first language Xhosa speaker. Where appropriate, these descriptions were supplemented by photographs taken during classroom observations when I visited the teachers. Two or three lesson plans were developed by each teacher. At the start of the course, one lesson plan was expected for each learning unit, but during Learning Unit 3 the course adapted responsively to teachers’ heavy workload at the end of the year, giving them the option of improving a previous lesson. In these cases teachers finished with only two lesson plans. The descriptions of classroom interactions are referred to as LP1[teacher initials], LP2[teacher initials] and LP3[teacher initials] for each teacher respectively. An example of one of these descriptions can be seen in Appendix F. These descriptions were used to write the sub-sections titled: *Teaching and learning activities*, in Sections 7.2.1.3 – 7.2.6.3, for each respective teacher (with a further level of analysis of the explicit, implicit and null curriculum as outlined in Section 5.7.1). Photographs referred to in the thesis are presented in colour ‘plates’ at the end of the presentation of each teacher’s

lesson plan (Chapter 7). Teachers had sometimes listed up to five integrated learning areas in their lesson plans, but the descriptions only reported the main learning area and only up to a maximum of two integrated learning areas (those for which a logical, albeit sometimes questionable, link to activities could be drawn). I found that this was sufficient to illustrate the main issues with choosing and implementing learning outcomes.

The workbook-format activities need to be considered in the light of the critical realist quest for ‘reasons as causes’ but with emphasis on discovering the ‘real reason’ or ‘alethic truth’, not simply propositions (see Section 2.2). The role that workbook activities played pedagogically was to influence and inform reasoning processes amongst learners and educators so that ultimately their lesson plans became ‘reasoned propositions’. For example, an exploration of local context underpinned reason for choice of environmental focus of lesson plan, and an exploration of curriculum requirements informed the choice of environmental activities that addressed these requirements. So insight into the teacher’s planning process enabled a better understanding of how classroom practice had been reasoned. Learners’ work (in the second section of each learning unit) provided insight into theory/practice inconsistencies; and teacher, school and community profiles and school and classroom observations (see Sections 5.6.5 and 5.6.6 below) provided insight into other (and likely more influential) factors and generative mechanisms that contributed to these inconsistencies.

5.6.5 Using questionnaires for school, community, teacher and classroom profiles

At the beginning of the course two questionnaires were given to each teacher:

- a) Towards a school and community profile considering location; learning areas; environmental education training, projects, opportunities and resources; and peer and community relationships (see Appendix G).
- b) Towards a teacher and classroom profile considering numbers of learners, learning areas, teacher training and qualifications, classroom practices (resource use and methods) and challenges, knowledge of environment and sustainability, and teacher roles (see Appendix H).

These questionnaires complemented the observations discussed in Section 5.6.6(a) below and provided an opening to understanding socio-economic and pedagogic challenges faced by teachers in their daily practice. They were used towards the descriptions of context in the sub-sections *School and community context* and *Teacher and classroom context* presented in Section 7.2 of the thesis. All teachers participating in the course filled in questionnaires. Documents were numbered as SCP1-17 (school and community profiles) and TCP1-20 (teacher and community profiles), but only those profiles of the six teachers participating in the study were used in the analysis (SCP1, 2, 4, 8, 11 and 17) and (TCP1, 2, 4, 8, 12, 18).

5.6.6 School and classroom observations

Eight observations were conducted with the six teachers participating in the study (two teachers requested an extra visit and so an extra two observations were conducted at these schools). Stark and Torrance noted that “observations can offer an insight into the sedimented, enduring verities of ... schooling – which are often at variance with new policies and/or the espoused preferences of participants” (2005: 35). For example, knowledge of a crowded classroom can raise questions about the expectations of a progressive competence curriculum model or an espoused concern for participatory teaching methods, which aims to achieve individual reflexivity, critical thinking and problem-solving competencies, thus providing insight into how theory/practice inconsistencies arise in school and classroom situations. Thus observations can help elucidate why lesson plan implementation does not always succeed in matching the expectation created by the reasoned proposition (the lesson plan).

The school observations were recorded through photographs and journal notes and later combined in an illustrated description (see Appendix I for an example). Photographs referred to in the thesis are presented as a series of ‘plates’ as discussed in Section 5.6.4. Lessons were conducted in Xhosa, but with explanations either from the teacher or Nomsa (who accompanied me on five of the visits), photographs, and lesson plans given to me by the teacher at the start of the lesson, I was able to reconstruct the lesson in the illustrated description in enough detail for my purpose. Each description was structured in two sections:

- a) **Teacher and Classroom Profile and School Context:** This part of each description provided detail of socio-economic conditions in the surrounding community and school; environmental projects in the school such as gardens, recycling and water management techniques; and classroom conditions and interactions. Combined with the contextual profiling data discussed below, this data was analysed and used to supplement the sub-sections *School and community context* and *Teacher and classroom context* presented in Section 7.2 of the thesis.
- b) **Lesson Presentation:** This part of each description presented detailed classroom activities and classroom interaction, and described use of learning and teaching support materials. This data was analysed and used towards the “Teaching and learning” descriptions presented in Section 7.2 in order to supplement the teachers’ portfolio descriptions of lesson plan implementation described in Section 5.6.4(b) above. Thus, the combination of my observations of a lesson and the teachers’ presentation of the lesson (in their portfolios) provided two different perspectives of classroom activity.

The descriptions from the observations are referred to in the text as O[teacher initials]1-2.

5.6.7 Teacher interviews

Seven interviews were conducted with the six teachers (one teacher required a second interview as we had not managed to cover enough ground in the first). These interviews were conducted after the classroom observation described above and included a discussion of the lesson plan development and

implementation that teachers were engaged in for course assessment purposes. Thus, these were long and in-depth, taking between one and two hours to complete. Interviews were audio recorded and transcribed. All teachers were second language English speakers (their first language being Xhosa) and in order to maintain authenticity of data, I did not correct grammar or English use in transcriptions and subsequent presentation of quotations in the thesis. (See Appendix J for an example of a transcribed interview.)

Interviews were unstructured and driven by the classroom observations and challenges experienced by the teachers during discussions of lesson plan development. This fits with the role of interviews described by Stark and Torrance as offering “insight into respondents’ memories and explanations of why things have come to be what they are, as well as descriptions of current problems and aspirations” (2005: 35).

An important role of interviews in critical realist research is their potential to open the discussion on reasons as causes. This interest is argued by knowledge of the causally efficacious capacity of reasons “which are able to generate and reconstruct structures back in the domain of the real” (Shipway, 2001: 165). However, the role of observations and contextual profiling techniques need to be employed in tandem with interviews so that researches can “then go on to check the veracity and plausibility of those statements [reasons] against the underlying structures and mechanisms which operate in that particular educational context” (ibid.: 167).

Teacher interviews were analysed and referred to as I1, 2, 3, 4, 5a, 5b and 6. The results of the analysis were presented in Section 6.4 (‘Course interactions and deliberations’) and Section 7.2 (‘Community, teacher and classroom context and course-related active learning processes’).

5.6.8 Informal correspondence

Three pertinent informal conversations were held with teachers via short message service (sms) and telephone. This informal correspondence was included in the case record and labelled IC(1, 2 and 3)

5.6.9 Summary of data generation methods

Table 5.2 below summarises the data generation methods discussed above together with their reference codes as used in Chapters 6 and 7.

Table 5.2 Summary of data generation methods

Method	Detail	Reference code
Document analysis	18 documents representing programmes and courses influencing the Schools and Sustainability Course	Doc 1-18
Workshop observations	3 regional workshops (RW) with workshop notes (WN) and 1 district workshop in King Williams Town (DW)	RW1-3, WN1-2, and DW1
Tutor interview	1 tutor interview	TutI1
Portfolio document analysis (a)	6 portfolios of 6 teachers, with 3 learning units (LU)s covered for each teacher	Port[teacher initial]-LU1-3
Portfolio document analysis (b)	6 portfolios of 6 teachers, with 3 lesson plans (LU)s covered for each teacher	LP1-3[teacher initial]
Questionnaires	6 School and Community Profiles and 6 Teacher and Classroom Profiles	SCP1,2,4,8,11 and 17 and TCP1,2,4,8,12,18
School and classroom observations	8 classroom observations, 1 with each teacher, plus 1 extra with each of 2 teachers	O[teacher initial]1-2
Teacher interviews	7 interviews, 1 with each teacher, plus an extra with one of the teachers	I1,I2,I3,I4,I5a,I5b,I6 and I7
Informal correspondence	3 sms and telephone conversations	IC1, IC2 and IC3

All of the data generation techniques described above (except the lesson plan outlines referred to in Section 5.6.4) were subjected to the Phase 1 analysis described in the following section.

5.7 DATA ANALYSIS

Data analysis in this study took place in two phases in response to the first three goals of the study as outlined in Section 1.8. Phase 1 was towards the first Goals 1 and 2 of the thesis, which were to “Describe the key influential initiatives, orientation, interactions and deliberations of the Schools and Sustainability Course” and to “Describe the context, planning and implementation of active learning processes in terms of their espoused and/or actualised situated, deliberative co-engaged, and action-oriented nature”. Phase 2 was towards Goal 3 of the study which was to “Use the ontological-axiological chain (MELD schema) to explain the relationship between active learning processes and transformative praxis”.

5.7.1 Phase 1 data analysis

The Phase 1 analysis in this study entailed processes of abduction explained by Danermark et al. as “to interpret and recontextualize individual phenomena within a conceptual framework or a set of

ideas”(2002: 80), thus highlighting the role of the theoretical framework of a study in the analysis stage. Abductive analysis in this phase was underpinned by two processes – thus entailing a three stage process described by Danermark et al. entailing i) description and ii) analytic resolution which is integral to the stage of iii) abduction (ibid.: 109-110). Description, according to Danermark et al. involves

An explanatory social science analysis usually starts in the concrete. We describe the often complex and composite event or situation we intend to study. In this we make use of everyday concepts. An important part of this description is the interpretations of the persons involved and their way of describing the current situation. (ibid.: 109)

Analytic resolution entails a separation or dissolution of “the composite and the complex by distinguishing the various components, aspects or dimensions” (ibid.: 109). In this thesis this stage was achieved through the use of Microsoft Word tables, Excel spreadsheets or through the construction of analytic nodes in the qualitative data analysis software programme – NVivo (elaborated on below). The abduction stage, according to Danermark et al. involves a process of “reworking, redescription, recontextualisation, reframing [and] deepening” (ibid.: 88).

Different sets of data or parts of data sets were treated to different analyses to serve different purposes. The first analysis in Phase 1 involved the **description** of the curriculum requirements selected by teachers in their lesson plans, **analytic resolution** through the use of Eisner’s (1985) explicit, implicit curriculum and null curriculum analysis (Section 4.2.4) and a stage of **abduction** which was integral to the analytic resolution. The abduction involved processes of ‘redescription’ as not only involving “description but also ‘redescription’ and detection of meanings and connections that are not given in our habitual way of perceiving the world” (ibid.: 94). The abductive ‘redescription’ was achieved through highlighting not only what was there in the policy document but also what was significantly absent from the document, that is, the null curriculum. Danermark et al. refer to recontextualisation as “to observe, describe, interpret and explain something within the frame of a new context” (ibid.: 91). The abductive ‘recontextualisation’ was achieved through considering normative assumptions from an environmental perspective (a new conceptual framework), for example, through highlighting an emphasis on ‘economic growth’ in the Economic and Management Sciences. This analysis was captured within Microsoft Word tables and presented as part of the descriptions of activities and curriculum requirements selected by teachers for each lesson plan in Sections 7.2.1.3 – 7.2.6.3.

The rest of the analysis in Phase 1 was organised under four analytic nodes (categories):

- **Analytic Node 1: Contextual and pedagogical history of the study.** The analysis at this node was applied to the historical documents described in Section 5.6.1. At this node the historical data was described by the various authors of the documents, and analytically resolved using an Excel spreadsheet (Appendix K). Finally the data was abductively

redescribed in Section 6.3 of this study in a new conceptual framework of situated, action-oriented, deliberative and co-engaged active learning – as elaborated in Chapter 3.

- **Analytic Node 2: Context of ‘school and community’ and ‘teacher and classroom’.** The analysis at this node was directed predominantly at school, community, teacher and classroom profiles; school and classroom observations; and teacher interviews. This analysis was descriptive in its presentation of the social-ecological context of the community, school and classroom; and the educational and environmental positions and practices representing a “‘point of contact’ between human agency and social structures” (Bhaskar, 1998b: 51 – Section 4.2.2). This analysis was undertaken using the qualitative software analysis programme – NVivo – for analytic resolution. No abductive inference was applied to the data in this phase.
- **Analytic Node 3: Course deliberations and interactions.** The analysis at this node was directed predominantly at workshop observations, the tutor interview, and workshop activities – analysed in portfolio document analysis (a). The descriptions of course deliberations and interactions in this analysis were drawn from quotations by teachers in their portfolios and in workshops and from tutors (including myself as course co-ordinator) in interviews and workshops. The data was analytically resolved used NVivo and abductive redescription was achieved drawing largely on literature presented in Sections 4.3 – 4.5 of this thesis.
- **Analytic Node 4: Lesson plan implementation.** The analysis at this node was directed predominantly at the portfolio document analysis (b), classroom observations and teacher interviews; with some additional data provided from teacher reflections on learner context and on the lesson plan implementation. The latter was captured during portfolio document analysis (a). Descriptions at this phase of analysis were mine (constructed during the observations) and the teachers’ (as presented in interviews and in their portfolios). The data was analytically resolved used NVivo. Abductive redescription was achieved drawing on the understanding of active learning as situated, transformative, deliberative and co-engaged as developed in Chapter 3.

Details of the four node analyses are presented below.

The focus of the Node 1 analysis was to acknowledge and understand the constituting processes of the Schools and Sustainability Course and the active learning processes that emerged from it. Analytic Node 1 used the following sub-nodes (or sub-categories) to describe the contextual and pedagogical influences on the course:

- Teacher professional development
- Whole school development
- Partnerships
- Curriculum issues (considering opportunities for environmental learning and curriculum purpose)
- Learning and teaching support materials (considering availability, provision, development and use)
- Situated learning
- Action-oriented learning
- Deliberation and co-engagement
- Open-process framework

Appendix K shows the historical analysis across nine Excel sheets representing these categories. This analytic node was used to construct the historical context of the Schools and Sustainability Course as reported in Section 6.3. This historical context, together with historical references in Chapters 3 and 4, and the local context captured in the Analytic Node 3 analysis described below was important in understanding the “tensed socio-spatialising processes” (Bhaskar, 1993: 160 – Section 2.4).

Node 2 – ‘local context’ – considered the context of the school, community, teacher and classroom.

Table 5.3 is extracted from NVivo and lists the context sub-nodes (sub-categories), the number of sources (documents) analysed under each sub-node, and the number of references (specific text selections) for each sub-node. The results of this analysis are presented in Sections 7.2.1.1 – 7.2.6.1 for school and community context, and Sections 7.2.1.2 – 7.2.6.2 for teacher and classroom context.

Table 5.3 Results of analysis under Node 2: Local context

Sub-node	Sources	References
Teacher roles and responsibilities	10	343
Learning and teaching support materials	4	330
Environmental projects	22	356
Teacher training	5	332
School context	19	353
Social-ecological context	19	355
Partnerships	10	341
School-community relationships	9	338
Classroom context	15	345

The Analytic Node 3 ‘course deliberations and interactions’ constructed in NVivo considered the deliberations amongst teachers and tutors in relation to school, community, course and curriculum requirements. This represents the first level at which teacher (and tutor) agency is engaged – at the 2E discursive level – as described in Section 2.6.2. Table 5.4 is extracted from NVivo and lists the ‘course deliberations and interactions’ sub-nodes, the number of sources (documents) analysed under each sub-node, and the number of references (specific text selections) for each sub-node. The analysis at this analytic node is presented in Section 6.4.

Table 5.4 Results of analysis under Analytic Node 3: Course deliberations and interactions

Sub-node	Sources	References
Deliberating environmental learning opportunities in the curriculum	33	88
Deliberating knowledge focus	10	26
Deliberating methods	6	6
Finding, choosing and adapting learning and teaching support materials	34	51
Deliberating assessment challenges	10	20
Deliberating curriculum and environment in whole school contexts	3	4
Interactions as an educational community	22	32
Identity-identification	8	15

Analytic Node 4 – ‘lesson plan implementation’ was constructed under three sub-nodes: Situated learning, action orientation, and deliberation and co-engagement. These sub-nodes were further subdivided at a third level as indicated in Table 5.5 below. Numbers of sources and references are also recorded in this table. The results from this analysis are presented in Sections 7.2.1.4 – 7.2.6.4 under the heading “active learning process”.

Table 5.5 Results of analysis under Analytic Node 4: Lesson plan implementation

Sub-node	Third level categorisation of sub-node	Sources	References
Situated learning			
	Exercise voice beyond the classroom	9	10
	Practical experience	46	63
	Reality congruence	52	75
	Relevance	55	74
	Relate to own experience	48	66
Action orientation			
	Hands on - minds on	31	44
	Reality encounters	16	19
	Trying out	9	14
	Activity - action	56	108
	Practical adequacy	32	50
	Values education	9	16
Deliberation & Co-engagement			
	Active construction of knowledge	65	87
	Community engagement	9	12
	Counter-hegemony	6	6
	Framing and reframing	4	4
	Mobilising prior knowledge	11	12
	Problem-solving	20	27
	Underpinning knowledge	70	150
	Critical thinking	18	20

The data from this phase constituted a description of the ‘actual’ (see Table 5.1) where the focus was on events and experiences. The next phase was a deepening analysis in the form of an explanatory critique of the phenomena described in Phase 1.

5.7.2 Phase 2 data analysis

The Phase 2 analysis in this study was a search for a totalising explanatory critique, described by Bhaskar as involving transcendental and/or dialectical argument (in this case, the inclusion of the MELD schema suggests ‘and’ dialectical). In this phase, the analysis drew on Bhaskar’s MELD schema in an attempt to provide an explanatory critique that encompasses the key features of critical realism as well as its dialectical elaboration (see Section 2.1) to arrive at an argument that is realist,

transcendental, naturalist, critical, ethical and dialectical. The dialectic aspect of the explanatory critique offered is dependent on a description of relationships based on an understanding that “the coincidence of the causal efficacy of ideas and their material conditioning will lend to any social dialectic a crucial (subject-object, agentive-structural, epistemic-ontic) *relational* aspect” (Bhaskar, 1993: 157). This analysis included retroductive analysis – as introduced in Section 5.2 and elaborated by Danermark et al. as “a mode of inference by which we try to arrive at what is basically characteristic and constitutive” of social structures and relations or argumentation seeking to “clarify the basic prerequisites or conditions for social relationships, people's actions, reasoning and knowledge” (2002: 96). This, they argue, is a necessary mode of inference which is an alternative to inductive inference. Inductive inference attempts either to draw conclusions “about an entire population from studies of a sample of investigated units (people, organizations, tests, etc.)”; or “from studies at a particular point of time, draw conclusions about other points of time” (ibid.: 86). The limitation of inductive inference is that it “gives no guidance as to how, from something observable, we can reach knowledge of underlying structures and mechanisms” – which is the purpose of retroduction (ibid.: 87).

In this case, this meant searching for an understanding of active learning as transformative agency (4D) in terms of its emergence from underlying 1M non-identity and absences, 2E negativity and absencing processes, and 3L considerations of laminated totality and the holistic whole (Section 2.6).

This Node 5 MELD analysis was underpinned by an Excel spreadsheet in which the evidence presented in Chapters 6 and 7 of the study was re-organised according to its relevance at 1M non-identity, 2E negativity, 3L totality and 4D transformative agency (Appendix L provides the main interests and foci within the MELD schema as used in this analysis). This analysis was then discussed retroductively in Chapter 8 structured by seven analytical statements which directly answered the research question: ***How do emergent active learning processes manifest as transformative praxis in the context of applied teacher professional development?***

5.8 RESEARCH VALIDITY

One aspect of validity, namely ‘reliability’ has already been discussed in relation to postmodernism and the possibility of reliable knowledge claims (Section 5.2). A second validity question relates to the move from ‘is’ to ‘ought’ as described in Section 5.2. Sayer questions the validity of this movement because of “the enormous difficulty of deciding on the nature of the good: what are the false beliefs and frustrated needs here” (2000: 166).

Sayer asked how, in the light of “local and contested” needs that exist beyond the notion of universal human needs, can advocates of critical realism bypass issues of pluralism and tolerance without resorting to highly abstracted and vague solutions to problems and at the same time without emphasising rights at the expense of responsibilities (Sayer, 2000: 167-168). He highlighted the need for enhanced reflexivity in an effort to “engage with normative questions of social organization and behaviour” (ibid.: 169). My understanding is that Bhaskar’s work offers us the necessary tools for reflexivity in the following ways:

- Making alethically grounded judgements (Bhaskar, 1993 – Section 2.6.1) so that they will only be made with knowledge of what is ontologically possible and actionable.
- Focusing on “absenting absentive agency” in the act of becoming which focuses transformative praxis on root Power2 relations (Bhaskar, 1993: 176 – Section 2.2).
- Considering judgements in the light of a ‘totalizing’ argument – in the light of the eudaimonistic or holistic whole (Bhaskar, 1993 – Section 2.2).
- Making judgements that are “expressively veracious” (Hartwig, 2007: 299; see also Norrie, 2010 – Section 2.6.4)

On moral reasoning Bhaskar elaborated that:

Moral reasoning is a species of practical reasoning, characterized, inter alia, by the fact that it is (non-uniquely) dialectically, and so specifically transfactually, concretely and actionably, ‘binding’ and universalizable in form, and that its ultimate object is flourishing human being-in-nature. (1993: 260)

Where he proposed an internal logic that:

(1) The action concerned, and the process more generally [should] not undermine the end or objective and be as far as possible consistent with it and (2) Insofar as it is possible, it [should] in some way express or embody the principles or values of the end-state or –process. (ibid.: 261)

A case in point would be Popkewitz’s critique of the technicisation of the liberal democratic ideal of education through interpreting change in terms of changing the individual to fit certain societal norms in such a way that created systems of exclusion (see Section 4.2.1). In this case the process (a technical application of an individualised progressive competence model of curriculum) undermined the ideal end process of democratic inclusion of all.

Reflexivity, as mentioned above, is particularly important for someone as close to the project as I was – a participant observer. During observations and interviews with teachers I could be described as a ‘participant observer’ which Patton (2002) elaborated as an observer who is herself immersed in the process that is being researched. Patton further elaborated that participation is something that can be described in degrees. In my case, I played a different role to the teachers (that of tutor/assessor) and so could not be considered to be fully immersed in their context or experiences. The conflation of tutor and assessor in the previous sentence is significant in that my educational intention during school

visits was synchronically directed at both supporting lesson plan development and helping teachers to meet course requirements to ensure that they attained a certificate at the end of the process. Because the course requirements were designed with developmental intent, my role during visits was that of formative assessor where assessment was a learning rather than judgmental process and was a problem that both teacher and I put our heads to during post-lesson interviews and during walkabouts in the school. This means that my role as participant observer had a distinct influence on the active learning processes being researched as was evident in refinements and additions to lesson plans made after these visits. This had a positive influence on the research in that my contributions from a professional development point of view, had the potential to add alternative, challenging or extending perspectives in order to stimulate participants' reasoning and reflexivity. This enabled an understanding of particular challenges and what needed to be in place in order that the phenomena being observed came to be as they were, and also an exploration of the opportunities and constraints on alternative possibilities.

A further validity issue is that of triangulation which is often posed as a tool for strengthening validity in research. Hammersley described the role of triangulation in research as:

Not an attempt to identify the truth about the scene witnessed, and therefore to assess the accounts produced by different participants in terms of how well they represent what went on. Rather, the approach adopted is closer to the sociology of knowledge: the interest is in why participants' accounts take the varying forms they do, or rather in how they have been put together. (2008: 25)

Critical realist research would respect the primacy of ontology indicated in the above statement. It would also be consistent with the idea that triangulation is not to assess how well accounts represent what went on, but would add that triangulation can provide perspectives from which to make an assessment in terms of how accounts (and associated actions) are representative of Power1 or Power2 relations in society and how they relate to the possibility of transformative praxis.

5.9 ETHICAL CONSIDERATIONS

Research with emancipatory intent, as with critical realism, needs to take consideration of the relationship between the research and its object in a way that demonstrates “respect for persons” described by Bassey as research that recognises a person’s “initial ownership of the data and which respect[s] them as fellow human beings who are entitled to dignity and privacy” (1995: 15). Bhaskar reflected that “it could be argued that judgements are per se patronizing and diminishing of the autonomy of the agents to whom they are addressed” (Bhaskar, 1993: 169). By taking into account the concrete singularity of individuals – that is their individual differentiation – researchers can develop an understanding that even though Bhaskar claimed that there is a direct chain of logic from ‘is’ to

‘ought’ (Section 5.2) , the notion of concrete singularity “guards against (non-concrete) Utopianism [and] also avoids the fallacy that ought implies can” (ibid.: 171). The implications of this for this study were that when recommendations (Chapter 9) were made in response to Goal 4 which was to “Reflect on the implications of the transformative praxis potential of emergent active learning processes for environmental education in the context of contemporary South African curriculum changes” (Section 1.8), these needed to be grounded in real possibility. This meant, for example, knowing the enablements (such as creative and inquisitive dispositions demonstrated by participant teachers), and constraints (such as those imposed by resource limitations, heavy workloads, and social-ecological complexities) on agency.

At the time of the research, permission was sought from principals to make observations in the schools (see Appendix N(a)). Furthermore, the research was supported by Department of Education officials that were tutors on the course. Particularly Nomsa Nxinga was highly supportive in her official role as Deputy Chief Education Specialist in the King Williams Town office, helping me to set up meetings with teachers and accompanying me on school visits to remote areas.

In the letters to teachers assurance was given that schools’, teachers’ and learners’ names would not be presented in the study. However, in subsequent discussions with five of the teachers, I established that they preferred to be acknowledged for their work and for their real names to be used in the study. Thus, in 2012, a second letter was sent to teachers and principals asking for formal permission to use the name of the teacher; the name of the school; and photographs of the school, learners and teacher (see Appendix N(b)). The sixth teacher has been kept anonymous (according to the original commitment to her) due to sensitive issues raised in her school context. This teacher has been allocated a pseudonym in the study (Zodwa Gxasheka), the school name has not been used, the school location is only broadly identified, and photographs have been cropped (or faces made ‘fuzzy’) in order to hide the identities of the teacher and learners. Names in all of the learners’ work presented in the study have been blanked out as the names of learners did not add any contextual understanding or depth to the study.

Another ethical concern posed by Bassey is “respect for truth” including reflexivity on the part of the researcher regarding her interpretations and assumptions (Bassey, 1995: 16). Reflexivity became essential on my part during this research because I was so influential in developing course materials, teaching the course, and writing reports throughout the course’s seven year history (Section 6.3.1). This meant that my own ideologies were entwined in the course ideologies so that it became important at certain points of the research to highlight my own authorship of ideas (see, for example, Section 8.2.2 where it became necessary to highlight my own influence in emphasising tangible change projects on the course). This need for reflexivity on the part of teacher educators is highlighted

by Ramsarup's call to acknowledge: "strong social/school change ideology ... and engage with this reflexively". She added that teacher educators need "to engage with the value dimensions of their programmes and clarify how they engage in values work with educators, to avoid ideological narrowing in their appropriations of the official pedagogic discourse" (Ramsarup, 2005: 101).

Because the focus of the research was not on tutors, tutor's names are not identified in transcriptions of discussions. Tutors are simply named Tutor 1, Tutor 2, and so on according to order of appearance in the transcript. This has largely created the impression of a homogenous group of tutors in the thesis. A homogenous group, of course, is not possible, but in this study not enough data was gathered to deepen the study through distinguishing tutors.

5.10 CONCLUSION

This chapter has related critical realist research approaches to a number of research traditions, illustrating a realism that shares an interest in ontology with positivist traditions but which includes a transcendental (beyond the empirical and the actual) element. It has related critical realism to the emancipatory agenda of critical theorists, while emphasising the danger of idealism and the need to address normative questions underpinning our interpretations and value judgements. Thirdly, it has related critical realism to a postmodernist acknowledgement of epistemological relativism while highlighting the need for judgemental rationality in order to establish a clear 'way forward' out of social science research endeavours.

The chapter also considered the implications of critical realism for this research as a case study, focusing particularly on the possibility of generalisation and arguing for a search for generative mechanisms which can be said to have a generic, but open-ended influence on society, rather than generalisation in the sense of predicting future patterns based on patterns identified in the case study. This case study was identified as a nested case focusing on the cases of six teachers nested within a broader teacher professional development course.

This was followed by a consideration of implications of critical realism for educational research by considering specifically how critical realist research would respond to questions such as school effectiveness and broader questions of quality in schools, and the influence of Power1 and Power2 relations in policy implementation. Also reflections on the implications of critical realist philosophy for environmental education considered its role in helping to understand transformative and rights-based interests in this field.

Next, data generation methods were described in detail followed by a description of the three analytic phases of the study explaining the use of two software programmes – Excel and NVivo – in Phase 1 and Phase 2. Phase 1 development of four analytic nodes (contextual and pedagogical history of the course; local context of the schools in their communities; course deliberations and interactions; and lesson plan implementation) to describe the course was explained; as was Phase 2 use of Bhaskar’s MELD schema to structure the Node 5 analysis in order to understand the manifestation of transformative praxis in emergent active learning processes.

Next the chapter addressed, more closely, the question of normative questions, as an issue of research validity, identifying alethia, possibility, absence, totalising critique/universalisability, and an internal logic as key considerations regarding this question.

Finally, the chapter outlined how the ethical questions regarding respect for persons and respect for truth were addressed through the critical realist influence in the research.

The following two chapters present the data as organised in Analytic Nodes 1-4.

CHAPTER 6: CONTEXTUAL INFLUENCES, COURSE DELIBERATIONS AND INTERACTIONS IN THE SCHOOLS AND SUSTAINABILITY COURSE

6.1 INTRODUCTION

This chapter gives a brief description of the materials and activities of the Schools and Sustainability Course. This is followed by review of influences on the orientation and development of the course with reference by other courses and initiatives dating back to 1997. The final section details interactions and deliberations that were stimulated by participation in the 2008 Schools and Sustainability Course and by planning the lessons which were produced for assessment purposes on the course. The chapter is a response to the first goal of the research which was to: “Describe the key influential initiatives, orientation, interactions and deliberations of the Schools and Sustainability Course” (Section 1.8) in order to address ***Research Question 1: How do emergent active learning processes manifest as transformative praxis in the context of teacher professional development?*** The chapter provides detail of the environmental education teacher professional development intervention which influenced the emergence of the active learning processes being researched in the study.

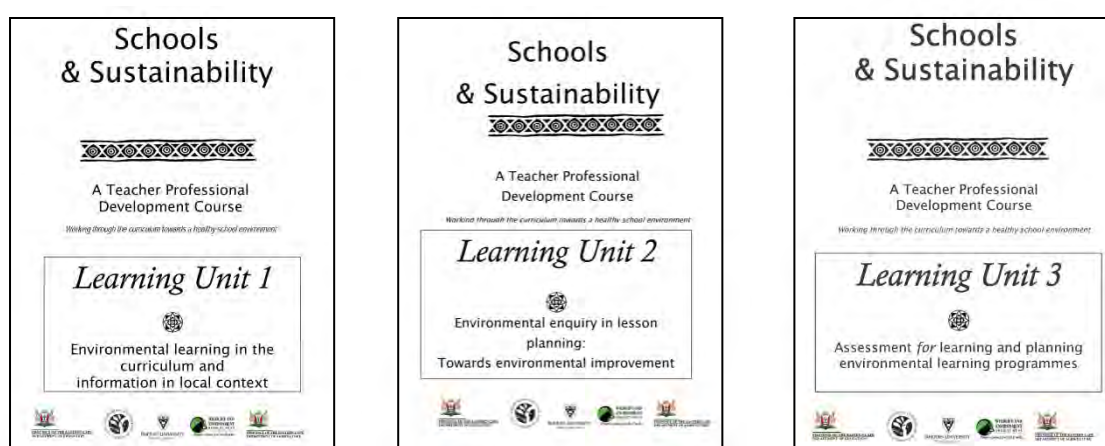
The next chapter presents the evidence of lesson implementation through reference to lesson plans, learning and teaching support materials and learners’ work (the second goal of the research).

6.2 BASIC COURSE STRUCTURE, MATERIALS, OUTCOMES AND ASSIGNMENT EXPECTATIONS

The course consisted of three learning units where teachers developed lesson plans³² focusing on information gathering (Learning Unit 1), enquiry into local context and action taking in response to identified issues and risks (Learning Unit 2) and assessment (Learning Unit 3). The covers of the three learning units are presented in Figure 6.1 below.

³²In the context of the course, a lesson plan was interpreted for teachers as an outline of a number of activities around a particular topic or focus (in this course a specific topic such as composting which could be related to environment or sustainability issues). These activities would conventionally run over about three to six lessons depending on the depth and scope with which the topic was addressed.

Figure 6.1 Covers of three Schools and Sustainability learning units



Each learning unit consisted of texts and activities in the style of a workbook, followed by an assessment task of developing, implementing and reporting on a lesson plan in which the ideas of the learning unit would be put into practice. Appendix O is an extract from the course showing the first two activities in Learning Unit 1. For assessment purposes teachers produced a professional portfolio which included completed workbook activities, lesson plans, learners' work, learning and teaching support materials and guided reflection activities. It is these portfolios which became a significant source of data for this study (Section 5.6.4).

The outline of the three learning units described below illustrates that, although the active learning framework was not explicitly taught in the 2008 course (as in the 2002/2003 prototype version of the course – Section 6.3.1), the logic of the active learning framework informed the 2008 course design. This is evident in the emphasis on information in Learning Unit 1, the emphasis on enquiry and action in Learning Unit 2, and the emphasis on reflection in Learning Unit 3.

Learning Unit 1: Environmental Learning in the Curriculum and Information in Local Context began by highlighting the first principle of the South African Revised National Curriculum Statements which emphasise the “relationship between human rights, a healthy environment, social justice and inclusivity” (South Africa. Department of Education, 2002j: 10 – Section 1.3). The activities that followed explored how this principle was evident in the purpose and scope of all learning areas, and in specific learning outcomes and assessment standards and core knowledge statements of the different learning areas (Section 4.5.2). Teachers were encouraged to do a “picture-scope” activity with learners where learners drew pictures of issues and concerns in their school and community. Teachers then examined how these issues and their school environmental programme integrated with the curriculum principle they had considered earlier. Following this, teachers examined one aspect of their environmental context and analysed what **information** was available and what was needed to

help learners to make informed decisions for a healthier environment. To support this they were introduced to different learning and teaching support materials with the intention that they would draw and expand on these as they required. The organisation co-ordinating the course – WESSA – provided relevant learning and teaching support materials as did the tutors in response to issues identified during workshops. The course encouraged teachers to reflect on what information they needed, where they would find it, and how they would use (either adapt it or use as a base for learner research) and present it to learners (consideration of teaching methods).

In Learning Unit 2: Environmental Enquiry in Lesson Planning: Towards Environmental Improvement teachers explored their learning areas for opportunities for introducing **enquiry**-based activities to their learners and considered ways of using these opportunities to gain more detailed understandings of the local school and community environmental challenges or possibilities they had identified in Learning Unit 1. The learning unit introduced teachers to a variety of qualitative and quantitative ideas for hands-on enquiries as well as tools for supporting these enquiries. Teachers were then encouraged to find or develop their own enquiry tools to suit the focus of their lesson plan. This was followed by an exploration of what **action** projects they could do in response to the concerns or possibilities they had identified through their hands-on enquiry. Appendix P illustrates the examples of enquiries and action projects that were used to illustrate the links between enquiries and school action projects for teachers during the course. These illustrate both direct actions such as “Encourage the growth of wild vegetables in the school garden” and indirect actions such as “Start a campaign to have healthier snacks sold at the school gates” and “Make a recipe book of food and medicinal recipes using indigenous plants from the area”.

In Learning Unit 3: Assessment for Learning and Planning Environmental Improvement teachers worked with different methods and techniques for assessment. A **reflective** element was highlighted with teachers reflecting on the state of their environment at the end of the course, the sustainability of any changes they had made with learners, and how their and their learners’ lifestyle choices may have been affected during the course of the year. They ended the course by drawing up learning programmes and work schedules to support environmental learning in the following year.

The lesson plan assessment task for each learning unit together is outlined in Table 6.1 below.

Table 6.1 Schools and Sustainability assessment tasks for each learning unit

Learning Unit	Assessment Task
Learning Unit 1: Environmental Learning in the Curriculum and Information in Local Context	Develop and implement a lesson plan to support learners to find, use and present environmental information. In the following pages you are expected to include your: • Lesson plan • Resources used • Examples of learners' work with reflections on their work.
Learning Unit 2: Environmental Enquiry in Lesson Planning: Towards Environmental Improvement	Design a lesson plan which will help learners to: 1. Do a hands-on enquiry around your chosen environmental focus. 2. Respond (either directly or indirectly) with an environmental ACTION to issues identified 3. Reflect on the learning that has taken place In the following pages you are expected to include your: • Lesson plan • Resources used • Examples of learners' work with reflections on their work.
Learning Unit 3: Assessment for Learning and Planning Environmental Improvement	This lesson plan should include activities to support learners to: 1. Collect, use and report on information (Learning Unit 1); 2. Enquire, act and report (Learning Unit 2). In addition you will need to include your assessment strategy. You will be expected to include examples of at least two assessment tools. At least one of your assessment tools should be a rating scale or rubric. You will need to show how you have used each tool in assessing one or two examples of your learners' work. In the following pages you are expected to include your: • Lesson plan • Resources used • Examples of learners' work with assessment tools and reflections on their work.

For each assessment task, teachers were given the choice of either adding to the previous lesson plan or presenting a new one. All teachers developed a second lesson plan for Learning Unit 2, but for Learning Unit 3 some teachers simply added assessment tools to their Learning Unit 2 lesson plan, others drew on a mixture of activities from the previous Learning Units and others developed an entirely new set of activities.

In the development of lesson plans, teachers were expected to foreground a 'main learning area' which was the learning area to be assessed. They were also expected to look for opportunities to link to other 'integrated learning areas' and draw on knowledge and skills from these learning areas in order to deepen knowledge and understanding in the main learning area. This process of integration was a specified curriculum requirement of the RNCS (South Africa. Department of Education, 2002j).

At the end of the course all teachers had completed a number of workbook activities and reflections on each learning unit, and two or three lesson plans. Lesson plans were complemented by examples of learners' work and accompanying learning and teaching support materials. The lesson plans were linked to at least one significant environmental action project in their school (for example a school garden or waste management system).

Successful participants received a Rhodes University Schools and Sustainability Course certificate. Holders of this certificate were credited with 12 credits towards the Rhodes University Advanced Certificate in Education (Environmental Education) qualification. This qualification was a 120 credit whole qualification for teachers wanting to specialise in environmental education. A 12 credit course requires the student to commit 120 notional hours to the course (that is 40 hours contact time in workshop situations, 40 hours planning and conducting lessons and 40 hours constructing a portfolio for assessment purposes).

6.3 INITIATIVES INFLUENCING THE SCHOOLS AND SUSTAINABILITY COURSE

This section gives an account of influences on the Schools and Sustainability Course covering: i) institutionalisation and partnerships, ii) teacher professional development, and iii) active learning. This is achieved through drawing on historical documents describing and evaluating the teacher professional development activities of relevant institutions and partners between 1997 and up to and including 2008. Here the reader is reminded of the major influencing programmes (Figure 1.1 – Section 1.3), notably the 1997-2000 Learning for Sustainability Project, the NEEP-GET pilot programme (2000-2001) and the nationally implemented NEEP-GET (2002-2006) in the development of the prototype Schools and Sustainability course and the various changes it went through up until 2008.

6.3.1 Institutionalisation and partnerships

As mentioned in Section 1.1, the 2008 course was a partnership between the Rhodes University Environmental Education and Sustainability Unit (responsible for Rhodes accreditation, materials development and lead tutoring), WESSA (materials development, fundraising, co-ordination and support tutoring), and the Eastern Cape Department of Education and Department of Agriculture (support tutoring). However, current partnerships are not the only influences in a project's orientation. Through outlining key institutions and partners in the development of the Schools and Sustainability course, this section highlights three features of course development that have significance for an interest in transformative praxis, namely i) assessment and accreditation, ii) provision of learning and teaching materials and other resources, and iii) organising frameworks for

environmental learning and action. The first feature – assessment and accreditation – is significant because of how individual assessment might affect transformative praxis which needs to take consideration of individuals and society “as two ontologically distinct entities, related in terms of emergence” (Hartwig, 2007: 468-469 – Section 2.4) and because of Jensen and Schnack’s emphasis that environmental problems are not only solved by decisions made by individuals but by addressing systemic structures of society (1997 – Section 3.3.2). The second feature – provision of learning and teaching support materials and other resources – is significant because of how learning and teaching support materials and practical and financial resources (such as seedlings and tools for a garden or finances to buy these) provided by significant partners influence the choice of environmental focus and possibility for practical action in active learning processes. The third feature – organising frameworks for managing environmental learning and environmental action in the schools – has implications for policy processes, management of roles and responsibilities and timing of activities.

During this review a number of documents are identified which highlight processes and challenges during the development of the Schools and Sustainability course between 2002 and 2008. These are the documents which were used in the document analysis (described in Section 5.6.1) and which were analysed under Analytic Node 1 (Section 5.7.1). At the end of the section, Table 6.2 highlights, from the review; the most significant aspects, partners, influences and key changes in the development and implementation of the course between 2002 and 2008. The review follows this paragraph.

The Schools and Sustainability Course was a Rhodes University accredited teacher professional development course. The prototype course was developed by the Rhodes University Environmental Education and Sustainability Unit and funded by the Worldwide Fund for Nature-South Africa (WWF-SA) as part of the NEEP-GET (see Section 1.3. for detail of the NEEP-GET programme). The prototype course ran for two years (from February 2002 to October 2003). Influenced by a cluster-based approach to teacher professional development (Janse van Rensburg & Mhoney, 2000 – Section 1.5), the course was structured as ten workshops per year with the teachers tasked to complete school-based tasks in between each workshop. These workshops focused on four topics, namely Analysing Environmental Issues, Environment in the Curriculum, Identifying Local Environmental Issues and Using and Active Learning Framework for Learning Programme Development (Doc 7: 3). At this stage of the course, the course materials consisted of tasks individually prepared and handed to teachers at each session.

The prototype course piloted the formalising of Environmental Education and Sustainability Unit’s teacher professional development work in partnership with the national NEEP-GET programme and successful participants received a Rhodes University certificate for satisfying the requirements of the NEEP-GET Short Course in Environmental Education. Teachers were assessed according to a

portfolio with completed tasks and active learning lesson plans covering three themes: Exploration of Conservation Issues in Makana, Personal and Community Health, and Resource Use (Doc 7: 5). Certificate holders were credited with 24 credits³³ towards the Rhodes University Advanced Certificate in Education (Environmental Education) (Doc 3: 26). This version of the course was run by Rhodes University Environmental Education and Sustainability Unit for teachers participating in the Makana NEEP-GET cluster with support from the Makana District Department of Education. The Makana NEEP-GET cluster was influenced by materials developed by the national NEEP-GET project and through participating in provincial Eastern Cape NEEP-GET workshops during which these materials were distributed and discussed. This is the motivation for the choice of the following documents for the analysis of influential initiatives in the development of the Schools and Sustainability Course:

- A learning and teaching support material developed to support implementation of the NEEP-GET pilot programme (Document 1)
- The national NEEP-GET pilot research report (Document 2).
- The provincial NEEP-GET report (Document 3)
- The final national NEEP-GET ‘Lessons Learned’ report (Document 4)

Further documents for the analysis of influential initiatives in the development of the Schools and Sustainability Course included:

- The programme of activities for the 2002/2003 NEEP-GET Makana cluster (Document 5)
- Reports to the funder (WWF-SA) on the 2002/2003 course (Documents 6 and 7 respectively)

In 2004 the Rhodes University Environmental Education and Sustainability Unit partnered with WESSA to streamline the course into a one-year Rhodes University certificate course for which participants received 12 credits (reduced from the original 24 credits) towards the Advanced Certificate in Education (Environmental Education). The streamlining of the course was in order to make it more accessible to outside partners who found that funders preferred a one-year part-time course which fitted within standard budgeting and reporting frameworks. In this year, the tasks used in the previous years were formalised into five learning units: Environmental Learning in the RNCS, Auditing, Policy and Environmental Improvement, Active Learning, Assessment of Learning, and Evaluation of School Environmental Policy Plans (Doc 8: 4). This one-year part-time model suited teachers better who tended to struggle to make such a long commitment to a short course (the first cohort of teachers had more than a fifty percent drop-out rate).

³³ Note that the credits for the two-year course required double the number of ‘notional’ hours as the one-year Schools and Sustainability course (Section 6.2). Thus time allocated for contact, planning and conducting lessons, and portfolio development was 80 hours each resulting in a total of 240 hours over two years.

The new course was run in four different contexts:

1. By Rhodes University with a new group of teachers in the Makana District in 2004 (one cohort).
2. On behalf of the Ethekwini Municipality, with teachers from the Durban area, and co-ordinated by Rhodes University and WESSA's national office (three cohorts in 2004, 2005 and 2006 respectively).
3. On behalf of the national Department of Water Affairs and Forestry, co-ordinated by Rhodes University and WESSA's national office, with tutorial support from regional offices of the Department of Water Affairs and Forestry, WESSA and the Department of Education, with teachers in the nine provinces of South Africa. Nine cohorts in the nine South African provinces completed the course in 2005. For the benefit of the Department of Water Affairs and Forestry funders the course was renamed 'Environment and Sustainability in Schools' but the name reverted to 'Schools and Sustainability' in 2006. Also, in this year, the course materials were re-organised into three learning units: Context and Environmental Learning in the Curriculum; Lesson Planning and Learning Actions for a Healthy Environment; and Assessment, Review and Forward Planning (Doc 15: 5-6). Notably, the learning unit title of 'active learning' was discontinued, even though the active learning framework as an organising structure for environmental was retained (Doc 15: 5).
4. On behalf of the Border-Kei regional office of WESSA, with teachers from King Williams Town, East London and Butterworth, co-ordinated by Rhodes University Environmental Education and Sustainability Unit and WESSA (Border-Kei), with tutorial support from the Department of Agriculture and the Department of Education. Two cohorts completed the course in 2007 and 2008 respectively.

The influence of these courses in the 2008 Schools and Sustainability course provided the motivation for drawing on:

- Document 8 (the report to WWF-SA on the 2004 Makana course);
- Documents 10, 11 and 12 (evaluation of the 2004, 2005 and 2006 Ethekwini courses respectively);
- Document 13 (a research report developed for the 2005 Department of Water Affairs and Forestry course), Document 14 (a report on the 2007 Border-Kei course); and
- Documents 9, 15 and 16 which represent the 2004 streamlining and the 2005 and 2007 reworks of the course materials respectively, as these were when the most substantial changes were made to the course design and materials.

A key partner in most of the Schools and Sustainability cohorts (Makana, Ethewini and Border-Kei) was the Eco-Schools programme (Doc 7: 6, Doc 8: 6, Doc 14: 4). The Eco-Schools programme required schools to develop lesson plans and environmental projects around a growing number of themes each year and to develop these within a 'whole school' context with strong school-community partnership involving learners, teachers, school management teams, school governing bodies and community members. Eco-Schools required schools to present a portfolio of evidence of lesson planning related to school improvement projects. On assessment of this portfolio, successful schools received certificates at different levels and ultimately an international Eco-Schools flag after five years of sustained environmental learning activities in the school. The influence of the Eco-Schools programme on the Schools and Sustainability Course was motivation for inclusion of the following document in the analysis of influential initiatives in the development of the Schools and Sustainability Course:

- Document 19 (the Handbook for schools participating the Eco-Schools Programme).

The Eco-Schools programme encouraged the development of school environmental policies (see Section 3.3.) in order to support and manage environmental learning and environmental improvement in the schools. Taken up in the NEEP-GET programme, the pilot project noted the challenge that "teachers needed a support base at the school, amongst their colleagues [due to] a lack of confidence in some teachers to implement new ideas, and resistance from senior teachers" (Doc 2: 66). However, despite challenges, the NEEP-GET evaluation report suggested that "starting with school environmental policies and management plans assists schools and teachers to clarify school and community priorities for environmental learning and assists with learning programme development and work schedule development" and that: "school environmental policies and management plans assist teachers to make links between whole school development and curriculum implementation" (Doc 4: 9). This success might be attributed to strengthening of a team-based approach to curriculum innovation and implementation recommended by the pilot research to facilitate confidence building, and make it "easier to withstand and overcome resistance in the school context" (Doc 2: 66).

The NEEP-GET Makana cluster followed the national programme's lead and supported school improvement through a focus on school environmental policies and action plans (based on their audits) (Doc 5: 1,2).

As it evolved, the Schools and Sustainability Course developed a different emphasis, as it was a programme for **individual** teachers designed to strengthen the lesson planning component of the Eco-Schools programme. In order to integrate with the Eco-Schools Programme, negotiations were made with the Eco-Schools national office that portfolios developed by individual teachers could be submitted to meet Eco-School requirements (Doc 8: 6). The 2004 course dedicated one out of five

learning units to auditing the school, developing a policy, and developing an action plan focusing on activities to engage learners in responding to issues around a particular theme (Doc 9). Materials were written in such a way that Eco-School 'whole school' requirements could be met with an integration of whole school approaches to environmental education.

However, loading the requirements for a school process on to one teacher became problematic. As reported by the Ethewini course co-ordinator: "Teachers struggled to juggle the many requirements of the course as well as the seven compulsory Eco-Schools focus areas" (Doc 10: 6). Despite this concern, a link to Eco-Schools was maintained in the 2005 're-organisation' of the materials from five learning units to three learning units. Eco-Schools became integrated into Learning Unit 3 where teachers were expected to "critically reflect on [their] school environmental policy and its links with curriculum (Doc 15: 6).

Other tensions that developed were recorded in the 2004 course evaluation:

1. "Some teachers had difficulty getting time off for workshops and struggled to persuade principals to support school environment policy work and action plans" (Doc 10: 5).
2. "Some teachers struggled to persuade other teachers to cooperate with them in a school environmental working group. Professional jealousy seems to have been one of the reasons for this lack of cooperation" (Doc 10: 11).

This problem raised the question as to whether it was valid to assess teachers for an individual certificate against a policy process that was dependent on a whole school process. This led to later models in Border-Kei (from 2007 onwards) which de-linked the course from Eco-Schools besides suggesting that they integrate their lesson plans developed during the Schools and Sustainability Course into their Eco-School portfolios. This is evident in the following extract from the 2007 course orientation:

In this course you will be developing lesson plans with specific environmental foci. These lesson plans can be used in your Eco-Schools portfolio and the course will help you ensure that those lesson plans have a strong educational foundation. (Doc 16: 3)

This removed Eco-Schools engagement as a formally assessed criterion from the course and left the task of policy development and planning for the Eco-School committee and for the Eco-School assessors to monitor. However, one particular element of the school environmental policy process, that is auditing of issues in the school through a picture narrative was retained in the course from 2007 onwards (Doc 16), as the need to situate learning in relation to school needs was acknowledged.

At the time of the removal of the school environmental policy process as a course requirement the titles of the learning units were changed to reflect changed emphases. These became the titles that

were presented in Figure 6.1 (Section 6.2). At this time the active learning framework as an explicit lesson planning tool was further de-emphasised by its removal not only from the learning unit title but from the course entirely. However, as explained in Section 6.2, emphasis on the different dimensions of active learning was retained, with ‘information’ and ‘enquiry’ explicit in the Learning Unit 1 and Learning Unit 2 titles respectively (see Figure 6.1), action implicit in the word ‘response’ (from the title of Learning Unit 2 – Figure 6.1) and explicit in the course text, and reporting integral to the assessment processes encouraged in Learning Unit 3 (Doc 16).

Table 6.2 Summary of partnerships, locations, influences and key changes in the development of the Schools and Sustainability Course

Course name	Dates	Partner roles	No. and location of teachers completing the course	Key changes and influences
NEEP-GET Short Course in Environmental Education (24 credits)	2002-2003 (two-year course)	* NEEP-GET – materials development and development of course outcomes * Environmental Education and Sustainability Unit (EESU) – materials adaptation and tutoring * Makana District Department of Education – tutor support * WWF-SA funding	8 from Makana District	* Course developed for accreditation in Advanced Certificate in Education (ACE) * Course materials in the form of workshop handouts * Influence of Eco-Schools in focus on school environmental policies and integrating lesson plans with environmental action plans
NEEP-GET Short Course in Environmental Education (12 credits)	2004	* EESU and WESSA (National office) – materials adaptation and tutoring in Makana and Ethekwini Districts respectively * WWF-SA funding for 2004 Makana cohort * Ethekwini Municipality funding for 2004	11 teachers – Makana; 13 teachers – Ethekwini	* Course changed from two years to one year, and credits reduced by half (still ACE accredited). * Task-based course materials re-organised to form 5 learning units (2004)
Environment and Sustainability in Schools (12 credits)	2005	* EESU and WESSA (National Office) – materials adaptation and course co-ordination * Tutoring from the Department of Water Affairs and Forestry (DWAF), WESSA (Border-Kei regional office) and Department of Education (2004) * Funded by DWAF with additional funding from Ethekwini Municipality (for Durban cohort)	75 teachers across the 9 South African provinces	* Materials aligned with the DWAF water education materials. * Materials re-organised to form 3 learning units

Schools and Sustainability Course	2006	* EESU and WESSA (National Office) – materials adaptation and course co-ordination * Tutoring from WESSA (National Office) * Funded by Ethekwini Municipality	18 teachers - Ethekwini	* No significant changes
Schools and Sustainability Course	2007, 2008	* EESU and WESSA (Border-Kei regional office) – materials adaptation and course co-ordination * Tutoring from Department of Agriculture and Department of Education * Funded through WESSA (Border Kei regional office)	21 teachers – Border Kei (2007); 13 teachers – Border Kei (2008).	* Streamlining of learning units by excluding Eco-School processes from assessment process * Removal of explicit teaching of the active learning framework, but more emphasis on processes central to the different dimensions of the active learning framework

This section has described the development of the course as a formally Rhodes accredited course undergoing a series of “streamlining” and “re-organising” processes. These processes included the reduction from 24 (220-2003) to 12 credits (2204) and the re-organising of course materials from a series of task-oriented workshops (2002-2003), to five learning units (2004), to 3 learning units (2005), and streamlining to exclude Eco-Schools processes from assessment (2007). It also described a removal of explicit emphasis to the active learning framework, accompanied by emphasis on the processes central to the active learning framework (2007). The adaptation of the course to incorporate materials on water from the Department of Water Affairs and Forestry implies a fluidity within the course design and an ability to work within Bhaskar’s vision of our world as an “open-systemic entropic totality” (1993: 50 – Section 2.6.2).

6.3.2 Approach to teacher professional development

6.3.2.1 A cluster-based approach to teacher professional development framed within a spiral model

This section presents data representing the influences of a spiral model for teacher professional development within a cluster-based approach to teacher professional development.

The Learning for Sustainability Project was an internationally funded environmental education teacher professional development course run in two South African provinces – Gauteng and Mpumalanga – (between 1997 and 2000) which was the antecedent to, and had significant influence on the subsequent nationally-implemented NEEP-GET project. Particularly the influence of its spiral

model for teacher professional development can still be seen in the projects discussed below. This project accounts for another two documents used for the analysis of influential initiatives in the development of the Schools and Sustainability Course:

- These were two documents describing the cluster-based spiral model approach to teacher professional development (Documents 17 and 18).

The Learning for Sustainability Project's motivation for developing a spiral curriculum model was a response to a growing acknowledgement of the inadequacy of 'cascade model' of information transfer used for in-service training under the previous system of education and by the Department of Education nationally and provincially (Doc 17: 15). This was a model of training and information dissemination whereby "information or content knowledge was passed down a chain of education officials, inspectors, subject advisors and then finally on to teachers" (Doc 17: 15) "with the assumption that knowledge would 'trickle down' to the teachers" (Doc 4: 17). The cascade model with 'once-off' training schedules was considered "inadequate for initiating deep change and transformation" (Doc 18: 12). The South African Department of Education supported the development of 'clusters' in different districts. The spiral model (see Figure 6.2) incorporated these structures and developed the idea of cluster meetings as 'work together' sessions, in between which teachers work individually on contextualised tasks started in the cluster meetings and completed or applied in their school-based and curriculum work as 'work-away' tasks. This enabled deepening knowledge, skills and competencies; increasing sophistication; increasing confidence, trust and professionalism; and the development of symbolic capital, meaning and conceptual familiarity over a period of time (Doc 17).

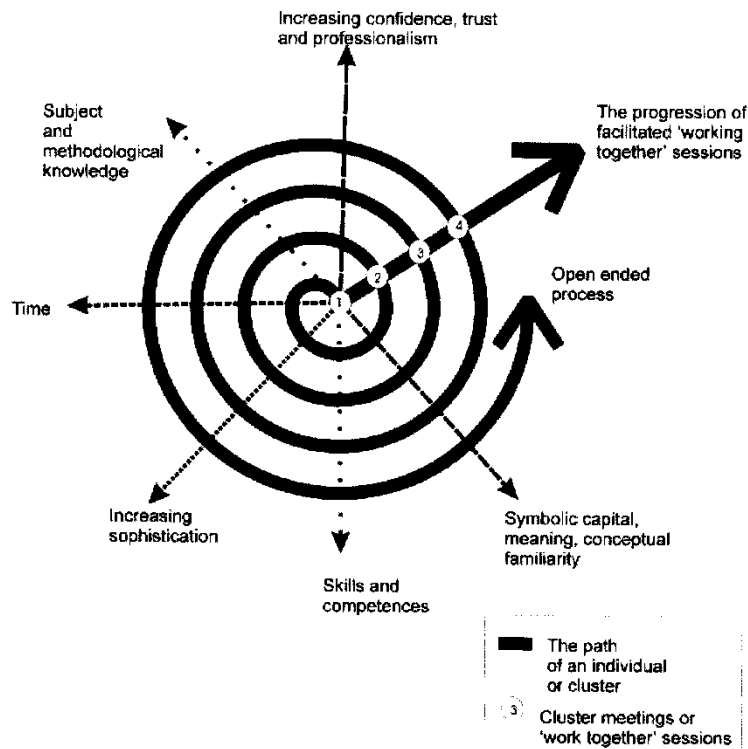


Figure 6.2 The spiral model for teacher professional development used within the Learning for Sustainability Project (Doc 17: 22)

The Learning for Sustainability Project identified ten key features of the spiral model synthesised from Doc 17: 24-25 as:

1. Contextualisation: teachers work with challenges from their own socio-political, biophysical and educational contexts.
2. Participation: Teachers participate actively in their own education by doing work-away tasks and by contributing to cluster discussions and activities.
3. Reflexivity: “Putting ideas into practice and then deciding on whether their implementation is useful or not can be an important tool for professional development”.
4. Dialogue: “The making of meaning is a socially negotiated process, and dialogue provides an opportunity for teachers to grapple with new knowledge, professional issues and classroom practice”.
5. Integration of theory and practice: Teachers discuss theories and ideas in cluster meetings and try these out in practice.
6. Flexibility: “Different contexts result in different needs and issues might have different relevance in different contexts”.
7. Democracy: “The spiral model requires a high level of negotiated self-determination and transparency”.

8. A constructivist approach with a caveat reminiscent of judgemental rationality in the light of judgemental relativism in complex decision-making processes (Archer et al., 1998 – Section 2.1; Sayer, 2000 & Hartwig, 2007 – Section 5.2). that:

It is important to recognise that there is not one single right way that can be adopted uncritically. The socially constructivist orientation of the spiral model acknowledges the importance of the construction of the most appropriate knowledge and a critical orientation to learning processes in a particular context.
(Doc 17: 25)

9. Development of sophistication of meaning: “The extended time frame and frequent dialogue that form part of the spiral orientation to professional development encourage the development of increasingly complex understandings around educational and ... environmental themes”.
10. Continuous learning: The long term nature of the model contrasts with a model of isolated input-oriented workshops.

Section 4.4 discusses the influences of authors such as Freire, Giroux, Robottom and Vygotsky in the inclusion of these features in South African environmental education teacher professional development.

Similarly the NEEP-GET responded to the Curriculum 2005 review team’s proposal for strengthening the dominant ‘cascade model’ for teacher professional development with ‘cluster and school-based models’ (Doc 2: 57). The NEEP-GET evaluation noted the need to address the problem of the “‘one-way’ transfer of information process that characterises ‘once-off’ training programmes” and reported a “need to slow down the process of ‘training’ offered in curriculum directorates, to ensure meaningful participation, feedback, review and improvement” (Doc 4: 12). The evaluation reported that “the cluster-based approach, framed within the spiral model was found to provide a mechanism that allowed for meaningful participation, feedback, review and improvement of practice – a continuous process of professional development” (Doc 4: 12). In the Makana cluster this model was seen as a way of supporting the national Department of Education’s call for the development of applied competence – through the integration of practical, foundational and reflexive competence (Doc 3: 25) (Section 4.3.1). The spiral model was trialled by the NEEP-GET in the different provinces (Doc 3: 14) and consisted of clusters of teachers at district level involved in “work-together [during workshops] and work-way tasks [implemented in the classroom], with discussion and reflection on progress and school-based implementation during regular workshops” (Doc 6: 3).

Teacher clusters were mostly co-ordinated by subject advisors from the Department of Education (the Makana cluster was an exception co-ordinated by Rhodes University, who were piloting the model for the Department of Education and the NEEP-GET programme) and supported by service providers.

The NEEP-GET pilot report argued that: "key to supporting teachers' professional development interests seemed to be the role played by support groups in the context of the project, including the researchers, the curriculum implementers and the provincial partners" (Doc 2: 66). The 2002/2003 Makana course was co-ordinated by Rhodes University in partnership with the Department of Education. The value of this is highlighted by the observation in the 2003 course report that:

Teachers struggled to work with and interpret the RNCS for their learning areas. [The Department of Education curriculum official] made a number of personal visits to the schools to help them in this regard. Teachers' portfolios show evidence that this extra commitment has helped them a lot. Also teachers have personally commented that the work with the formal curriculum that they have done through the Makana Project has helped them in subsequent Department of Education workshops. (Doc 7: 8)

In King Williams Town Nomsa (the Department of Education official supporting the 2008 Schools and Sustainability King Williams Town Cluster) was a subject advisor (Doc 3: 21). Nomsa participated in the King Williams Town NEEP-GET cluster programme (Doc 3: 21) and continued to support environmental education during and after her participation in the Rhodes University Advanced Certificate in Education (Environmental Education) (Section 6.3.1) from 2005 to 2006. Thereafter she played a key role on the King Williams Town 2008 Schools and Sustainability Course in her role as Deputy Chief Education Specialist in the Curriculum Section of the King Williams Town District of the Eastern Cape Department of Education. During the time of the 2008 course, Nomsa attended and successfully completed a Rhodes certified capacity building course for tutors as part of her involvement in the Schools and Sustainability Course (Doc 14: 2).

The NEEP-GET pilot project highlighted the need for the cluster-based spiral model for teacher professional development as a "practical, implementation-based approach to Curriculum 2005 professional development which takes as its focus the learning processes in schools" (Doc 2: 66). In support of this call, the Ethekewini evaluation report (working on the same model) noted that teachers reported that they had learned more from the course than from the RNCS workshops conducted by the Department of Education (Doc 11: 2; Doc 12: 2). The final NEEP-GET evaluation report continued to argue for the same model with the comment that in-service education for teachers should be a responsive process which should "explore ways of being positive about educational change, and should continuously seek alternatives and be responsive to changes in context, and educators' experiences and needs" (Doc 4: 12).

The NEEP-GET evaluation warned that:

Cluster-based professional development is an appropriate model for enabling the development of applied competence ... [it] needs, however to be ongoing over a period of time, and it needs to have a clear framework and programme (outcomes to be achieved over a period of time). There is evidence that this model of professional development is being interpreted differently in the DOE, where cluster-based approaches are seen more as an organisational/structural framework for organizing teacher meetings, rather than

as a site for supporting and developing applied competence amongst teachers.
(Doc 4: 12)

The description of the 2008 course with three regional workshops where key concepts were introduced and lesson planning begun, interspersed with district workshops where lesson plans were further developed and discussed (see Section 1.1) illustrates the structure set up in the Schools and Sustainability Course to support a cluster-based spiral model of teacher professional development. In this model the ‘work-together’ tasks happened at two levels (regional clusters and district clusters) while the ‘work-away’ tasks happened when teachers finalised and implemented their environmental projects and lesson plans in their schools (see Figure 6.3 below).

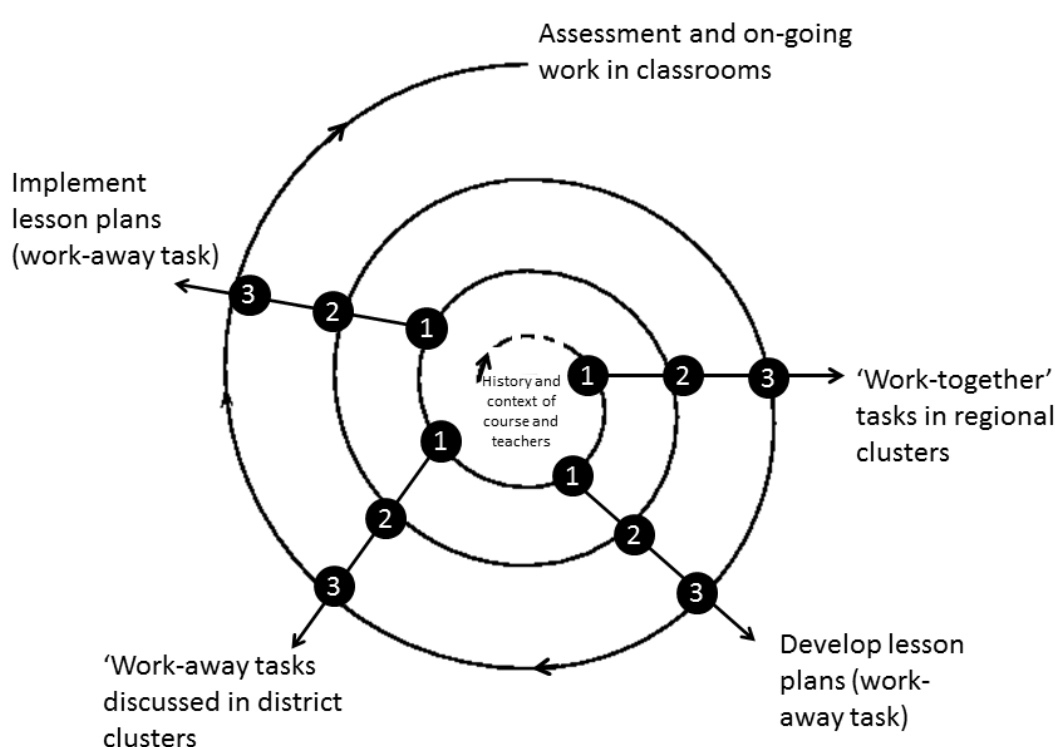


Figure 6.3 Representation of the Schools and Sustainability as a cluster-based spiral model of teacher professional development

The NEEP-GET evaluation also warned that: “successful clusters depended on: integrating the cluster approach within the district strategy, Department of Education working closely with partner groups, and curriculum support staff being allocated time and resources” (Doc 4: 15).

Despite attempts to integrate the coursework with expectations by the Department of Education, the 2002/2003 course still reported that:

We struggled to get teachers to complete three model lesson plans during the course of the year. At times we considered reducing the number of lesson plans to two, but on consideration, we noted that the teachers are expected to develop lesson plans throughout the year, so that to expect three with an environmental focus should not be too much of a problem. It is important, as noted above, that lesson plans are developed in such a way that they become part of the teachers' normal course of work and not an additional project which they struggle to complete. (Doc 7: 13)

6.3.2.2 Course design and pedagogical approaches

This section presents data from the review of historical documents that relates to the professional development outcomes used in the course. These outcomes are illustrative of a flexible course design as discussed in Section 4.4.1 by drawing on Lotz's (1999: 22) description of how broad outcomes allow flexibility where course designers "develop the courses in different ways and even use different materials, while allowing participants to meet the same requirements for certification". This section particularly presents data relevant to the research-based focus of the Schools and Sustainability Course. Further, it discusses how teacher portfolios played a key role in the research-based focus of the course and raises some challenges with the development of reflexive competence amongst teachers, which was one of the intentions of the research-based approach to teacher professional development. The use of teacher portfolios is significant in relation to teacher professional development because of their intended role in developing teachers as reflective practitioners as discussed in Section 4.4.3.

The Schools and Sustainability Course was influenced by the national NEEP-GET project's set of professional development outcomes which were developed in the context of a competence model of teacher professional development (Taylor, 1999 – Section 4.3.1) as represented by the South African Norms and Standards for Educators policy document (South Africa. Department of Education, 2000 – Section 4.3.1). The use of professional development outcomes was also in line with other SADC professional development courses, aimed at enabling "a diversity of responsive and flexible curriculum processes" (Tlaleane in Lotz, 1999: 20 – Section 4.4.1). The NEEP-GET professional development outcomes were developed in order to guide the provincial and district clusters across the country (Doc 3: 26). A comparative analysis of the 2008 specific course outcomes illustrates the influence and links to these nationally developed outcomes (see Table 6.3 below). These **specific** outcomes are an extension of the **general** course outcomes outlined in Section 1.1, and are specific to the three learning units (as indicated in brackets in column 2 of the table).

Table 6.3 Comparative analysis between national NEEP-GET outcomes and the 2008 Schools and Sustainability Course outcomes

National NEEP-GET outcomes (Doc 3: 26-29)	2008 Schools and Sustainability Course specific outcomes (Doc 16: 6)
<i>Teachers should be able to:</i>	
Analyse environmental issues in context	Identify contextually relevant issues through use of a picture-scope and analyse these issues through enquiry-based activities (Learning Unit 1)
Plan, implement and evaluate a unit of work with an environmental focus	Collect evidence of, and reflect on, learners' work (Learning Units 1, 2 and 3)
Interpret and apply an environmental focus in a learning area	- Identify opportunities for environmental learning within the RNCS and in their own learning area (Learning Units 1, 2 and 3) - Identify appropriate learning outcomes and assessment standards for their own grade, learning area and chosen environmental topic (Learning Units 1, 2 and 3) - Develop contributions towards work schedules and learning programmes to plan environmental learning for the year ahead (Learning Unit 3)
Demonstrate an understanding of a range of environmental learning processes	- Develop a lesson plan to support learners to use, find and present [environmental] information (Learning Unit 1) - Link enquiry activities to their learning area, and incorporate these in a lesson plan (Learning Unit 2) - Help learners to develop a response to environmental issues (Learning Unit 2)
Adapt, use and develop learning support materials in the development of a unit of work	- Gather information relevant to an aspect of their social-ecological context (Learning Unit 1) - Adapt or develop learning and teaching support materials to support a hands-on local enquiry (Learning Unit 2)
Select and apply relevant methods and assessment processes and reflect on their appropriateness for environmental learning	- Develop and implement an appropriate assessment strategy (Learning Unit 3) - Collect and annotate evidence of achievement of RNCS learning outcomes in learners' work (Learning Units 1, 2 and 3)

In the Makana cluster, teachers' portfolios were assessed against these outcomes and in order to develop their reflexivity, they were encouraged to assess their own portfolios against these outcomes (Doc 6: 3). Later, in the Schools and Sustainability Course, this reflexive intention was expressed as one of the course outcomes which was to: "collect evidence of own and learners' work, annotate and narrate in a professional portfolio of evidence" (Doc 16: 6).

One of the challenges that arose because of the open-ended nature of the environmental learning processes supported in the course is highlighted by an Ethekewini course evaluation report which stated that: "The more open-ended the tasks are, the harder they are to assess. But we should avoid being too prescriptive in our assignment requirements" (Doc 10: 9).

Significant in influencing the NEEP-GET project and subsequent courses that developed out of it was the notion of 'resource-based learning' and 'research-based learning' (Doc 2: 6). Resource-based learning is discussed in Section 6.3.3.2 because of its link to learning in context while research-based learning is discussed in this section. Research-based learning was described as a process of engaging teachers in ongoing processes of action and reflection as they developed, implemented and reflected on lesson plans as presented in their portfolios (Doc 3:24, 26).

Portfolios were seen as a key catalyst for the research-based focus of teacher professional development. The NEEP-GET pilot report noted that the portfolios "had the dual purpose of providing for a collection of evidence of professional development and supporting the development of teachers as reflective practitioners" (Doc 3: 25). "Teachers' portfolios provided the teachers and researchers with evidence [of active learning processes] which they discussed during interviews, reflective meetings at the schools and in evaluative reflections of teachers' own portfolios" (Doc 2: 62).

The NEEP-GET evaluation reports on the importance of reflection in developing reflexive practitioners in its statement that: "reflexive practice requires educators to apply what they are learning, and to reflect critically on the application of their ideas in practice" (Doc 4: 19). At the same time the report highlights a distinction between reflection (thinking about) and reflexivity (applying knowledge in practice).

Despite the intention of the course to develop reflexivity amongst teachers, the Makana and Ethekewini course documentation noted that this ideal was an ongoing challenge. This can be seen from the following quotes:

- "While teachers had the ability to reflect informally on learners' development of awareness attitudes, knowledge and skills, few provided evidence of this by linking their comments to the evidence of learners' work provided in their portfolios" (Doc 7: 11).

- “The NEEP-GET professional development outcomes were a useful framework within which teachers could reflect on their own professional development. Two of the teachers did this very successfully, while other teachers, besides their obvious commitment to their own professional development, struggled to conceptualise their own development within a formal framework” (Doc 7: 12).
- “Teachers justify the activities – simply explain the value of the lesson and assume the children do learn what they intended them to learn. They don't probe the educational value of the learning process in enough depth” (Doc 10: 11).
- “Often reflections are not well explained or justified and there are no references to learners' work to justify views. The portfolios revealed a general lack of critical and analytical thinking” (Doc 10: 18).
- “Teachers reflections tend to focus on logic and feasibility of the lesson as indicators of success – they don't really look for evidence of learning” (Doc 10: 20).

The NEEP-GET final evaluation noted that such research-based focus in teacher professional development required “ongoing, careful scaffolding, and a practical orientation” and “structured support ... to encourage rigour and reflexivity” (Doc 4: 19).

6.3.2.3 Professional development needs

The discussion below illustrates how the Schools and Sustainability Course was designed with formal Department of Education intentions in mind, namely those explicated in the RNCS, the national Integrated Quality Management System (Education Labour Relations Council, 2004) and the Norms and Standards for Educators policy document (South Africa. Department of Education, 2000). This was to ensure that environmental learning was not seen as an additional burden on teachers already working in challenging contexts (Sections 1.4, 1.5, 1.6 and 4.7). The section also highlights some of the challenges and successes with overcoming challenges posed by these course intentions.

Table 6.4 below shows how the Schools and Sustainability Course activities integrated with a number of Integrated Quality Management System (Section 4.3.2) performance standards as described in a training manual developed by the Department of Education for introducing this system to teachers (Education Labour Relations Council, 2004: 17). This link was established with the intention that teachers could also use their Schools and Sustainability portfolios for Integrated Quality Management System purposes which were, at the time, a requirement for teachers but which were virtually unsupported in schools. Thus the intention was for the course to integrate with Department of Education requirements and to help teacher engage with policy in a meaningful way.

Table 6.4 Integration of Schools and Sustainability Course activities with Integrated Quality Management System performance standards

Integrated Quality Management System Performance Standard	Schools and Sustainability Course activity
Creation of a positive learning environment	Developing context-specific action projects for school environmental improvement
Knowledge of curriculum and learning programmes	Reviewing learning area purpose and scope, learning outcomes, assessment standards, and core knowledge for environmental learning opportunities
Lesson planning, preparation and presentation	Teachers planned for environmentally focused learning through integrating local environmental issues and risks in learning programmes and work schedules, prepared environmentally focused lesson plans (with appropriate learning and teaching support materials) and presented these (gathering evidence in the form of learners' work)
Learner assessment/achievement	Developing and using appropriate assessment tools

For its justification the course drew on a need to contextualise the RNCS as well as to realise the environmental learning content and potential of the RNCS. It relied substantially on the view of the teacher of playing the seven roles outlined in the Norms and Standards for Educators (South Africa. Department of Education, 2000 – Section 4.3). This document outlined an expectation for educators to fill a number of roles which were supported by the course as evident in Table 6.5 below:

Table 6.5 Schools and Sustainability Course activities in related to educator roles as outlined in the South African Norms and Standards for Educators document

Educator role	Way the course supports this role
Learning mediator	Teachers developed a variety of challenging environmental learning activities to support understanding, enquiries and actions
Leader, administrator and manager	Teachers lead environmental learning programme development activities amongst their peers
Interpreter and designer of learning programmes and materials	Teachers developed environmentally focused lesson plans and learning and teaching support materials to support these
Scholar, researcher, lifelong learner	Teachers were supported to develop reflexive learning through portfolios as indicated above. Also, teachers completing the course were awarded a Rhodes certificate in Environmental Education
Community, citizenship and pastoral role	The course supported teachers to develop practical projects to respond to hunger, waste and health issues in their school and community
Assessor	Learning Unit three focused specifically on assessment because a concern for quality education through environmental learning was raised through numerous references to difficulties with assessment in environmental education research (see bullet two below)
Learning and subject discipline/phase specialist	Teachers were expected to deepen their understanding of their learning area requirements, outcomes and assessment standards and to deepen their knowledge of appropriate environmental content relevant to their learning area needs

Most course participants agreed (in the contextual profile) that all of these roles were important for a teacher, despite concerns raised by education research in South Africa about the inflated role of teachers (Section 4.3.3).

In terms of teacher knowledge and skills, the various documents analysed identified a number of challenges for teachers:

- In the final NEEP-GET evaluation report, there was a concern that teachers need to develop their understandings of learning (Doc 4: 9) and also to understand the context of learning and learners in more depth (Doc 4: 7).
- Curriculum challenges included a need to ensure adequate scope and depth for different grades and phase requirements (Doc 2: 65; Doc 4: 7); a need for learning area appropriate methodologies to strengthen interpretations of learning outcomes and assessment standards (Doc 4: 6); a need to align learning outcomes, assessment standards, activities and assessment criteria (Doc 12: 19); and a need to ‘unpack’ learning outcomes and assessment standards for assessment purposes (Doc 10: 20; Doc 12: 19).
- The selection and adaptation of learning and teaching support materials in the context of learning outcomes, for lesson plan development and for scaffolding learning (Doc 4: 7; Doc 12: 19).

Notable as a successful strategy for supporting these particular needs, was the use of lesson plan exemplars and case studies of different learning actions (Doc 10: 6; Doc 11: 3).

6.3.3 Influence of active learning in the Schools and Sustainability Course

In Section 3.2 an explanation is given of the active learning framework used to inform the 2008 Schools and Sustainability Course. In this section more attention is given to the development and use of the framework in the evolving Schools and Sustainability Course, followed by an analysis of key features of active learning as outlined in Chapter 3, namely situated learning, action-orientation, and deliberation and co-engagement.

6.3.3.1 Active learning framework

This section pinpoints changes in the evolution of the active learning framework which are significant to the development of transformative praxis. Firstly, there was the inclusion of an interest in mobilizing prior knowledge which is important for developing “agentive perspectivity” through knowledge of the “pre-constituted world” (Bhaskar, 1993: 141-142 – Section 2.4) and which is

significant in considering the ontological possibilities for transformative agency. Another significant change was the expansion of the notions of environmental ‘issue’ and ‘focus’ to also include risk. This is significant to transformative praxis because of a need to understand change practice within a world of “continuous change and ever-present uncertainty” (Wals, 2007a: 37 – Section 3.4). Risk also relates to the notion of contingency in critical realist philosophy which calls for a “quest for non-observable generative mechanisms whose powers may exist unexercised or be exercised unrealized, that is with variable outcomes due to the variety of intervening contingencies which cannot be subject to laboratory closure” (Archer, 1998a: 190 – Section 5.2). This is relevant for transformative praxis in that it helps identify aspects of society which may be changed in positive ways, so environmental educators are not just responding reactively to environmental issues which are already problems, but also proactively making “a shift or switch to a new way of being and seeing” (Wals, 2009: 385 – Section 3.4).

The framework was used in the prototype course where all teachers developed learning programmes for their learning areas using the framework (Doc 5, 6 and 7). The framework was an earlier version of the framework presented in Section 3.2 and was developed by O’Donoghue for use in the pilot NEEP-GET Programme in 2000. It was presented in the following document: *Active Learning through Outcomes Based Education* (Doc 1: 6). This version of the framework had three key dimensions: Find information, explore and question, and act and report. These dimensions centred around an issue or focus and were driven by six key questions: 1) What do we already know? 2) Who can we contact? 3) Where can we find information? 4) How can we investigate the issue in our local environment? 5) How can we do something about it? 6) What have we learned and achieved? (see Figure 6.4) representing three dimensions of ‘active learning’ 1) Finding information; 2) Exploring and questioning; and 3) Acting and reporting.

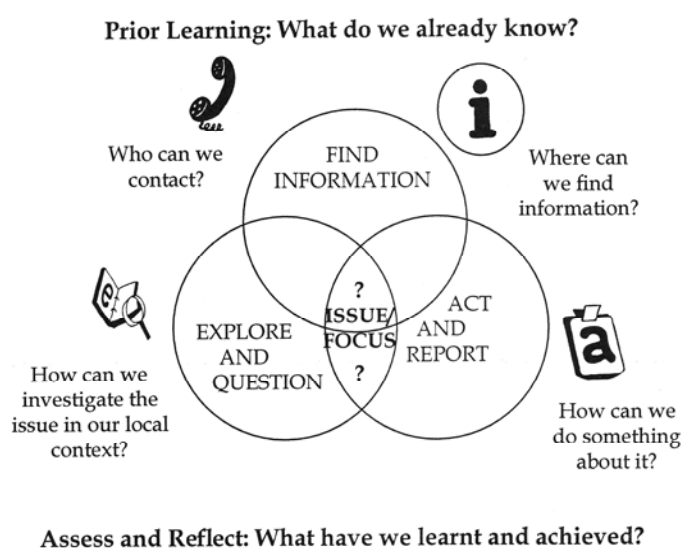


Figure 6.4 Prototype active learning framework

Influenced by the NEEP-GET pilot project, Rob O'Donoghue revised the framework (O'Donoghue, 2001) to the version presented in Section 3.2. The revisions included:

- More emphasis on **mobilising** prior knowledge in order to find out 'what we know';
- A clarification that the central focus of the framework could be an 'issue', a 'risk' or a 'concern';
- An emphasis on 'tuning in' and 'concluding connections'; and
- The 'Act and Report' dimension was separated into two 'action' and 'reporting' (Doc 2: 32).

In the Makana, Ethekwini and Department of Water Affairs and Forestry cohorts, this revised framework was used explicitly to support teachers in developing environmental learning processes (Doc 3: 24; Doc 5: 1, 2; Doc 9: 4; Doc 15: 5). "In the Makana cluster, certain foci were identified for the purpose of lesson plan development, including the exploration of conservation issues in the Makana District, personal and community health, and resource use" (Doc 3: 27). These foci formed the context in which active learning took place.

Reflections on the NEEP-GET nationally and locally in Makana, illustrate the role that the school environmental policy process and partners played in helping to select the focus for environmental learning. The provincial NEEP-GET report noted that:

School environmental policy frameworks appear to provide schools with the opportunity to define their own priority focus areas, and then to invite support from a range of partners. This allows schools to maximise and draw on partner interventions and materials as needed in the school (rather than as presented by the partner group). (Doc 3: 23)

The Makana cluster worked with the municipality to open up issues around waste, a provincial government health department (Health Promoting Schools) to open up issues of health and hygiene, a community-based organisation (the Millennium Tree Planting Project) to open up the value of indigenous trees, and a student organisation (from Rhodes University) in order to discuss issues around medicinal plant harvesting and use (Doc 4: 9).

In reflecting on whether a lesson plan should start by identifying a 'problem', the coordinator reflected that:

While it is not always necessary to start with an environmental issue ..., one would expect the environmental focus to emerge through local enquiry and exploration of the focus. The environmental focus did not always emerge though, so that sometimes the lesson plan did not progress beyond simply learning about the [surroundings]. (Doc 7: 10)

6.3.3.2 Situated learning

The selection of an environmental focus is part of situating learning in local context. Further elements of situated learning from the review of influential initiatives in the development of the Schools and Sustainability Course are presented in this section; these are teaching and learning methods to support situated learning, and their associated challenges of identifying and deepening knowledge of issues and risk in local context. Secondly the section focuses on learning and teaching support materials for contextualizing learning and the challenges with the selection, adaptation and use of these. Such enquiry activities (and learning and teaching support materials to support the enquiries) are significant to transformative praxis because (as argued in Section 4.2.4) of their potential to enable construction of knowledge of non-actualised possibilities and associated absencing processes (Bhaskar, 1993) as well as 2E inconsistency or contradiction (Hartwig, 2007). Section 4.2.4 argues that this knowledge plays a key role in informing change-oriented active learning that is not only realistic, but also relevant to learners' and their communities.

In the NEEP-GET project, the Makana District focused on the "exploration of contextual environmental issues and developing responses to these in the school and classroom context" (Doc 3: 24). In order to explore issues in context:

Teachers worked with learners to develop 'picture narratives' of local environmental issues. Teachers also undertook a 'picture-scope' activity with learners to identify and draw environmental issues that were of concern to them in the school context. Based on these pictures, teachers were then encouraged to work with learners to develop narratives of environmental issues in the school context. (Doc 3: 5)

One of the challenges with this activity was that "some teachers and their learners reflected more of a focus on environmental 'features' as opposed to environmental issues" (Doc 3: 26). This led to a call (in a Makana NEEP-GET report) for "guidance in identifying local environmental issues, risks and concerns. All of this needed to be underpinned by a good understanding of the meaning of environmental issues, risks and concerns" (Doc 7: 10).

Another methodology to support situated learning was a school environmental audit based on a School Environmental Policy Toolkit (Doc 5: 1, 2) developed by WESSA and also used in the Eco-Schools programme. However, apart from the success of the audit in helping schools to choose their environmental focus (reported in Section 6.3.3.1) another challenge was a deepening of those audits into understanding specific issues and problems. The NEEP-GET pilot research reported:

A tendency towards a more general exploration of issues, rather than honing in on how these issues manifest within a local context. Teachers appeared to have had little opportunity to engage with knowledge around specific issues and so attempted to engage learners in exploring these issues without having developed their own understandings and perspectives. (Doc 2: 24)

This need for foundational knowledge for exploring local issues is discussed further in Section 6.3.3.4.

In addition to foundational knowledge, teachers also needed experience with different enquiry methods beyond the general audit. A NEEP-GET report listed a range of enquiry processes teachers were using to enable a better understanding of environmental issues and risks, for example undertaking school-community investigations of local issues, fieldwork, and exploring local and indigenous ways of interacting with the environment (Doc 4: 10).

In an attempt to achieve greater depth in enquiry activities, the Eco-Schools programme distinguished between a general audit, which was renamed a ‘review’, and a ‘theme-specific audit’. This is outlined in the extract below:

Themes must be dealt with carefully and thoroughly! We suggest that you start your work in your chosen theme area with another audit – a theme-specific audit. For example, if you choose ‘Resource Use’ as a theme, and your whole school review [audit] shows that there is no management of water use at the school, you could choose a sub-theme (topic or issues) of ‘Resource Use: Water’, and then conduct a water audit at the school. (Doc 19: 8)

The Schools and Sustainability Course followed this lead with the focus on different enquiry activities. Audits were included as one amongst other methods (ecological studies, observations, mapping, descriptive essays, surveys using interviews and surveys using questionnaires and surveys using interviews).

One of the consistent orientations of the NEEP-GET pilot programme, and the subsequent versions of the Schools and Sustainability Course, was attention to ‘resource-based learning’. In all cases, resource packs contained learning and teaching support materials covering different environmental topics. These were provided to supplement the course materials with the understanding that "contextualised approaches to curriculum development require a flexible range of learning support materials that can be selected and adapted for use in a local context" (Doc 2: 44), thus responding to the need to design flexibility into materials where ‘outside’ facilitators might be unfamiliar with “local cultural and educational requirements” (Fien & Tilbury, 1996: 70 – Section 4.4.1). The packs covered topics such as greening, indigenous plants, waste, air pollution, energy, water, sanitation, nutrition (Docs 1, 8, 10, 11, 12). These resource-based materials were contextualised in three ways:

- a) Teachers could choose an appropriate topic (see those listed above),
- b) Activities in the packs were designed to help teachers and learners explore the local context as is evident from this extract from the 2005 course materials:

We will learn about environmental auditing as a tool for getting to know our environment better, and will use a variety of teaching and learning support materials

from the Department of Water Affairs and Forestry 2020 Vision for Water pack to help identify, explore, act and reflect on environmental issues and develop a relevant lesson plan incorporating auditing as a teaching strategy. (Doc 15: 5)

Despite the intention for the resource-based learning packs to help with contextualising activities, this was not always successful, for example,

The Department of Water Affairs and Forestry materials provided a comprehensive set of activities for helping teachers and learners to explore their local context. However, some teachers appear to have simplified some activities to the point that they no longer provide insight for a useful, in depth analysis of the local situation. (Doc 13: 21)

- c) Teachers were expected to adapt the materials to their context, for example, the 2008 course supported teachers to select and adapt environmental information resources and considered methodologies for making meaning of these with learners in their own context (Doc 16: 4). These activities were explicitly designed to help teachers to think about adaptation considering an ongoing focus (from the time of the NEEP-GET pilot research) on teachers' need to "select and adapt [learning and teaching support materials] to broaden their existing knowledge and experience of environmental issues and risks" (Doc 2: 47) and ongoing concerns, even at the end of the project, that "teachers need help to select and adapt learning and teaching support materials" (Doc 4: 17). An example of this concern from the NEEP-GET project is a researcher's report that "the Grade 10 Biology learners and their educator served as the main sources of information as learners battled with the level of language used in the resources" (Doc 2: 43).

6.3.3.3 Action orientation

In this section elements of the influential initiatives in the development of the Schools and Sustainability Course that relate to an action-oriented approach to active learning are presented. The presentation of the limitations of 'hypothetical situations' or 'hypothetical actions' (within real situations) relates to a lack of grounding in reality at the level of the actual in the case of the former and, in the case of the latter, to a lack of grounding at the level of underlying structures and mechanisms. This failure to acknowledge a depth ontology is significant because the failure to acknowledge the stratified nature of reality (Bhaskar, 1998a – Section 5.2) can lead to the epistemic fallacy or the "hypostatization of thought" as in the Hegelian dialectic (Bhaskar, 1993: 74 – Section 2.6). This section also presents strategies amongst key influential initiatives of the Schools and Sustainability Course for grounding active learning processes in practice; that is, grounding learning in the 'enquiry' dimension of the active learning framework and in school environmental policy processes. This is relevant for the research interest in transformative praxis because of the 4D interest

in developing a “unity of theory and practice in *practice*” (Bhaskar, 1993: 9, author’s emphasis – see Section 2.6.4).

The problem of ‘hypothetical situations’ is discussed in the light of the NEEP-GET pilot research’s call for learners to “focus on problems in meaningful ways” (Doc 2: 81). That this meaningful learning is not easily achieved, is highlighted in the research of the Department of Water Affairs and Forestry cohort of the Schools and Sustainability Course which raised the concern that:

A number of reviewed lesson plans involved learners in enquiring into hypothetical situations. While these enquiries may have been useful in developing learners' language to enquire into situations, the lack of authenticity meant that there was either no incentive for learners to respond to an... issue or responses were hypothetical.
(Doc 13: 21)

The Makana NEEP-GET project noted that “higher order thinking skills such as evaluation should help learners to select appropriate actions and to argue for certain actions” (Doc 7: 22). The 2008 course tried to emphasise the connection, between enquiry and a response (action), through Learning Unit 2. This was made explicit in the learning unit’s title: “Environmental enquiry in lesson planning towards environmental improvement” (Doc 16: 4). The course notes highlighted that: “enquiries need to be accurate and meaningful so that informed choices can be made regarding appropriate responses to problems and issues highlighted in local environments” (Doc 13: 23).

Another skill also highlighted in the NEEP-GET programme was developing “insights and competence for making better environmental management and lifestyle choices” (Doc 2: 81). Action (as a response to environmental issues) in the different courses was promoted through the development of school environmental policies and action plans (Docs 4,5 and 6) and through Eco-School links (Doc 3) which focused on a process underpinned by three foundations: environmental learning, school improvement and community involvement. This three-pronged foundation is illustrated in the following extract from the 2005 Department of Water Affairs and Forestry course:

Our course is informed by the same key principles as Eco-Schools, namely curriculum work, community involvement and environmental improvement towards whole school development. It is important to note that the curriculum aspect of Eco-Schools is the essence of this course and it is that aspect of the course for which you will be assessed. However, in order to make improvements in the environmental health and lives of the community, curriculum work needs to be integrated into the context of environmental management towards whole school development together with strong community links. Thus Eco-School requirements have been integrated into the course. (Doc 15: 4)

Some concerns regarding the nature of actions evident in teachers learning interactions were raised during the NEEP-GET research which reported that: “there appeared to be some confusion between notions of action and activities, reflected for example in collecting leaves or making objects as forms of ‘action taking’” (Doc 3: 28).

In cases where action was more oriented towards an environmental response as highlighted in the notion of action competence (Section 3.3.3), there were concerns raised that:

Indirect actions such as writing to the municipality and drawing of action plans for school and home, can often end in no action because the suggestions are unrealistic, as implications of implementation have not been thought through, or because powers such as municipalities, household heads or principals may not have the will or the means to implement the actions. In such cases learners may end up feeling disempowered by their actions. (Doc 13: 21)

In Section 6.3 above the link with Eco-Schools as a partner was discussed. Notably, the 2004 Department of Water Affairs and Forestry course had no explicit links to Eco-Schools which led to the reflection in the research report that: "Eco-Schools may help many of the schools turn hypothetical actions into real actions, to develop partnerships with organisations to follow up and develop alternative responses where indirect actions have not had effect" (Doc 13: 23).

This same research reflected that action was impeded:

When proposed actions are hypothetical as learners are not challenged (unless by the teacher and through careful critique of their proposed actions) as to the practicalities and social and political implications of their proposed actions. The other problem with hypothetical actions is that while cognitive understanding and values may have changed, no tangible change takes place in terms of school and community environmental improvement. (Doc 13: 21)

This section has presented data relevant to ontological depth in actions and change. The following section presents data from the analysis of influential initiatives in the development of the Schools and Sustainability Course relevant to the cognitive and affective (values-oriented) aspects of change referred to above. This data relates to a deliberative and co-engaged approach to active learning.

6.3.3.4 Deliberation and co-engagement

This section presents data from the analysis of influential initiatives in the development of the Schools and Sustainability Course which represents a concern with the superficial interpretation of environmental issues and an emphasis on developing foundational knowledge for environmental learning. This relates to Lotz-Sistka's highlighting of the "difficulties in dealing with environmental knowledge that is contested, not certain or not available" (2011: 20 – Section 4.5.4) and with teachers' suggestion that they themselves are "not adequately equipped with necessary pedagogical skills to assist their learners to engage with contested knowledge" (ibid.: 20). This concern also relates to Parker's argument that "lack of knowledge reduces our capacity for effective moral agency" (Parker, 2010: 223 – Section 4.2.3).

The section also presents data that illustrates propositions made by course developers and facilitators in order to respond to these difficulties. This data reflects an implicit knowledge amongst course developers of issues that need to be tackled in order to enable active learning processes that manifest as transformative praxis. It represents reflection on the relationship between local and global. Also, data is presented which represents reflection on environmental issues as constituted by biophysical, social, economic and political dimensions. This data relates to a transcendental realist account of science which is grounded in the “specificity and emergent properties of the social realm” (Archer et al., 1998: xiv – Section 2.1). It also relates to the re-institution of science in a way that embraces a discourse not only driven by scientific ‘experts’ and imposed values derived from this discourse (Lacey & Lacey, 2010 – Section 4.2.3). Finally the section presents data which represents reflection on the role of indigenous knowledge in active learning processes. This is relevant to the notion of culturally grounded prior knowledge which (as argued in Section 6.3.3.1) is important for agentive perspectivity and knowledge of the pre-constituted world (Bhaskar, 1993). Data is presented below.

Crucial to the ability to deliberate is a capital of foundational knowledge, the value of which is argued in the 2005 NEEP-GET evaluation report:

There is need to support teachers to develop foundational knowledge of environmental issues and risks, as many interpret these superficially. This affects the scope and depth of outcome interpretation and ultimately the learning outcomes of learners. (Doc 4: 7)

In the 2008 course, there was an emphasis on the need for contextualised information, as is evident from the title: "Environmental Learning in the curriculum and information in local context" (Doc 16: 4), the intention being to contextualise information both in terms of the local context and needs as well as in terms of curriculum needs, in response to the issues associated with foundational knowledge. This intention can be traced to the comment in the NEEP-GET final evaluation that: "Contextual responsiveness requires a 'balance' between policy/project priorities, and local social and contextual needs" (Doc 4: 20).

Foundational knowledge in the courses was also built through a mobilisation of prior knowledge. This goal was refined, after the 2002 NEEP-GET pilot project, with elaboration of the question: “What do we already know?” (Doc 2: 32). This meant exploring what knowledge was available amongst learners and community members. Particularly the “mobilising of indigenous knowledge” was explored as a useful starting point for school-based learning actions (Doc 4: 5). Drawing in parents to help with this met with challenges, however, as "some learners mentioned that their parents were not able to help them either because they were not available or were not interested in what was asked of them" (Doc 2: 44).

Another important source of foundational knowledge – the provision of learning and teaching support materials – was argued for in the NEEP-GET pilot research report: “teachers need to select and adapt [learning and teaching support materials] to broaden their existing knowledge and experience of environmental issues and risks” (Doc 2: 47). An important source of learning and teaching materials for environmental learning was “contributions from other government departments and partner groups [which] provide important knowledge and information that can be used in exploring environmental issues and risks in more depth” (Doc 4: 10).

Challenges reported with the provision of learning and teaching support materials were:

- The level of language used in the resources (Doc 2: 43).
- Teachers struggled with "expressing themselves in English, understanding and following what is happening in the workshops, reading and interpreting the more complex learning support materials, conceptualising and making new and foreign concepts their own" (Doc 2: 66).

These challenges meant that “teachers often resort to ‘old knowledge’” (Doc 4: 6).

Also crucial to the ability to ‘deliberate’ is the need to develop skills and tools for critically evaluating and applying knowledge, as argued in the 2005 course evaluation document which stated the need to take “learners beyond the simple transmission of knowledge ... and develop higher order skills ... such as evaluating, planning, analysing etc.” (Doc 13: 19).

The argument for the development of skills and tools for critically evaluating knowledge could be found, for example, in the NEEP-GET pilot project which operated with the understanding that "considering the biophysical, social, economic and political dimensions of environment helps us to understand environmental problems" (Doc 1: 5). However, the research report at the end of the pilot project noted that: “very few schools attempted any in-depth work on waste management systems, the more complex causes of waste production, or impacts of waste on the environment (beyond the superficial)” (Doc 2: 41).

In response to this concern, the NEEP-GET Makana District (and continued in the Schools and Sustainability Course) where course activities encouraged “the analysis of environmental issues generally in order to help teachers gain an understanding of the holistic nature of environmental issues” (Doc 3: 14). This was supported through the introduction to a social-ecological model of environment “to help analyse environmental issues. They [teachers] looked at different cases and pictures and discussed them from this holistic perspective” (Doc 5: 1-2).

However, even at the end of the NEEP-GET project, the challenge of critically understanding environmental issues and risks was still highlighted with the observation that:

In the Eastern Cape ... many teachers continued to experience difficulty with understanding the implications and full potential of active learning and working with it in much depth. The focus of most programmes developed using the framework was firmly on 'action', with limited analysis of issues or justification offered for particular actions relevant to environmental issues. (Doc 3: 28)

As a result of these challenges, the NEEP-GET evaluation recommended that:

There is a need to support educators to understand environmental issues and risks from local, national and global perspectives, and from within a human rights/social justice framework in order to ensure that the environmental focus in the curriculum is not superficially interpreted. (Doc 4: 6) (see also Doc 7: 10)

Classroom challenges to deliberation and co-engagement were reported in the NEEP-GET project, for example, one researcher noted that “learners' involvement in the discussions were restricted in the sense that learners were mainly discussing answers to the questions raised by the teachers” (Doc 2: 44). Group work was a teaching methodology engaged by teachers in order to support deliberation and co-engagement, but the NEEP-GET research reported a concern that: “group work was applied to almost any activity. The strong focus on group work does not allow the individual learners to develop the necessary skills” (Doc 2: 44).

Another challenge in deliberative processes is the question of values education. The 2008 NEEP-GET report highlighted a transformative approach to values education with its statement that:

In environmental education processes, a strong emphasis is placed on values and attitudes, and to avoid values education (values are embedded in the principles of the curriculum) becoming impositional, there is a need for the development of critical thinking, and critical analysis of issues in context. (Doc 2: 27)

By describing challenges and ideas over a period of time regarding how foundational knowledge is expanded and developed, this section has concluded the review of the Schools and Sustainability Course and the initiatives influencing its situated, action-oriented, deliberative and co-engaged nature.

6.4 SCHOOLS AND SUSTAINABILITY COURSE INTERACTIONS AND DELIBERATIONS

The above section presented pertinent issues amongst initiatives with key influence in the development of the Schools and Sustainability Course. This section draws on transcripts from regional workshops (RW1, RW2 and RW3), classroom and school observations (O), interviews (I),

teacher portfolios (Port) and summaries made by the researcher of each lesson plan (LP1, LP2, LP3) to describe the relational interactions during the 2008 Schools and Sustainability Course:

- between and amongst teachers and tutors, and
- between teachers and tutors, and curriculum structures (the Revised National Curriculum Statements) and teacher professional development structures (course materials and workshop activities).

6.4.1 Deliberating environment learning opportunities in the curriculum

The following sections present Schools and Sustainability Course interactions and deliberations while searching for environmental learning opportunities in the curriculum, from a broad perspective where environment is defined and debated, to the role and purpose of learning areas, to details of learning outcomes and assessment standards. This is important for understanding the deliberations and challenges experienced when teachers and tutors interact with curriculum structures; such as the curriculum principles and the scope, content and learning outcomes of learning areas; in order to find a suitable focus for environmental learning and associated active learning processes.

6.4.1.1 Working within a rights-based curriculum framework

Section 4.5.1 described the democratic and rights-based ideologies presented in new curriculum policy (Chisholm, 2000), especially as expressed in the first principle of the RNCS which calls for an understanding of the “relationship between human rights, social justice, a healthy environment and inclusivity” (South Africa. Department of Education, 2002j: 10 – Section 1.3). This relationship was illustrated through a case study presented in the course (see Figure 6.5 below).

Many South Africans live in conditions of under-development, because of an unjust political and economic history. Many women still collect firewood for fuel. A lack of alternatives may force them to use up the wood near their homes, and to go searching ever further. This makes them vulnerable to sexual assault. They may also resort to chopping down growing trees. This leads to deforestation (the loss of trees), which harms soil fertility, biodiversity and affects our life support systems. However, generating electricity for the nation also contributes to unhealthy environments. Coal power stations use huge quantities of water and create serious air pollution, which adds to the greenhouse effect and which also affects the health of those forced to breathe the air. The USA and South Africa contribute disproportionately to the production of greenhouse gases. These gases create global warming that is likely to affect the whole world, harming most seriously those people who have few alternatives, such as small island nations, fishers and small-scale farmers. If I teach this topic to a class which includes the children of Eskom employees¹, in such a way that they feel discriminated against, I have violated the principle of inclusivity in education.

Adapted from Rosenberg, 2003. *A Workbook for Developing Learning Programme Units with an Environmental Focus in Natural Sciences*. National Environmental Education Project, Department of Education, Pretoria

Figure 6.5 Case study extracted from Schools and Sustainability Learning Unit 1, illustrating the relationship between human rights, social justice, a healthy environment and inclusivity

Figure 6.6 below illustrates a following course activity where teachers were asked to draw a mind-map reflecting on the relationship between their school environmental programme and the first curriculum principle.

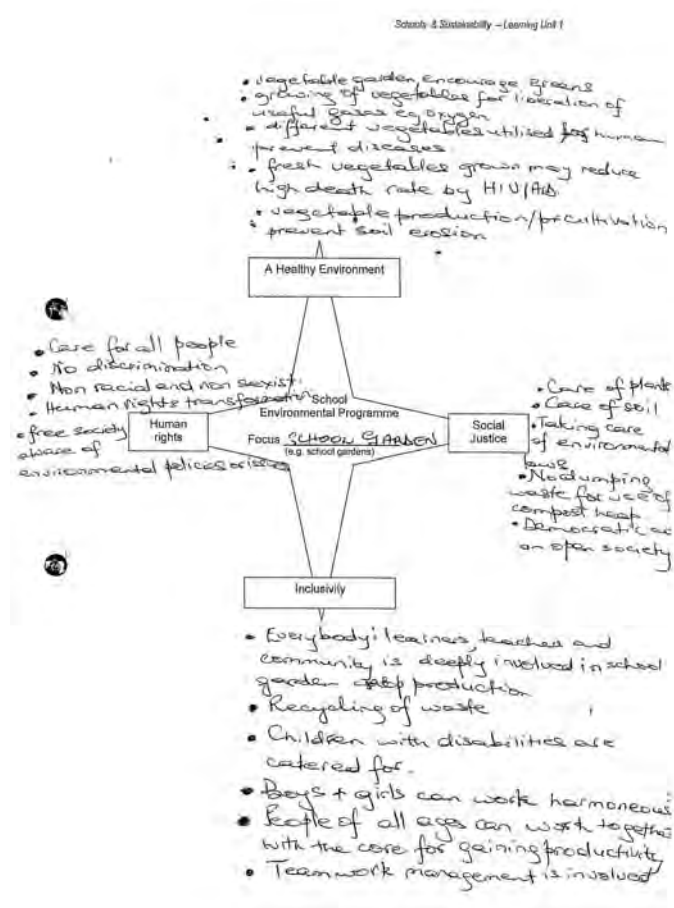


Figure 6.6 Teacher’s mind-map illustrating the relationship between the school garden the RNCS first principle

In a regional workshop, one of the tutors, seeking to lay the foundation for a transformational approach to dealing with nutrition in the classroom, encouraged the introduction of complexities of human rights, social justice, environmental health and inclusivity (the curriculum first principle) through the use of stories which teachers wrote themselves. These dealt with issues such as poverty, unemployment, single parenthood, malnutrition and associated health concerns (LPNS1, NMLP1). In beginning to think about this principle one teacher explained how it related to:

Awareness of life-threatening issues like not having basic human rights like access to clean water, healthy living conditions and proper sanitation. There are social, economic and political factors that cause a negative impact to people's activities and relationships with the environment, for example, people's living conditions in dense squatter camps, poverty, deforestation (in order to have materials to build new shacks as they are destroyed by fire and floods which remove them now and again) high rate of crime, numerous infectious/chronic diseases due to poverty, unemployment and illiteracy.

People's values and attitudes of social justice, human rights and healthy environment.

Life: being neglected due to over-population growth, sharing one toilet for approximately one thousand males and females vice versa in a squatter camp. All the latter have a negative effect to learners' lives at school - being teased by others about their social-economic environment. The learners will use their enquiry skills to investigate these environmental concepts using the knowledge, skills, values and positive attitudes they gained at school in order to make choices for alternative solutions for sustainable living in a democratic society. (PortXN-LU2: 5)

This teacher expressed her appreciation of having the first principle brought to her attention: "Thank you very much my tutor for being such eye-opener to me. You are really stars, because from our Department of Education it was not clearly stated that the lesson planning should include the first principle in such a vivid way like you did" (PortXN-LU2: 32).

This understanding of environment as a foundational guiding principle can be contrasted with the understanding of teachers outside of the course. One course participant explained that her colleagues still saw environmental learning as something outside of the curriculum:

It was just for them – you know in environmental studies. Even in the olden days. It was not something that was taken up by teachers. They used to do it when they are tired or afternoon. Or ... it was not like the other – Maths and – ... it was just something ... extramural. They didn't take it – much as they know that it appears in the policy, from their learning outcomes and assessment standards. But they didn't take it very serious.(I3)

Teachers indicated an understanding of environment as ecological and, in other cases, integrated with social issues as well:

- One teacher explained:

I first started to be interested in veggie [vegetable] gardens. So it started then for me. Though on that time I had little knowledge about that food garden is also in the environment part. So as the years go I became interested in environment as a whole. As a result at school – every day after school there are some doves. I asked the pieces of bread from the bread cutters. So every day after school, when the learners are out, they came to that parking area. So I gave those birds the leftover bread. So that is why I say I like environment because environment includes every – it is about nature – you know.(I2)

- Another teacher integrated environment with a social element as well:

When you talk of environment it is not environment only. It also includes the people, ... it also includes the cultures. Even there in the garden it will not be just only the vegetables. We have to have herbs [as well]. And also I will do research for the Ghanaian food. Because I said to the principal that I want a Heritage Day to see the types of food that are eaten by the different people here .(I4)

6.4.1.2 Environment as integral to all learning areas

With a developing understanding of the rights-based elements of environmental learning (see Section 6.4.1.1), teachers were engaged in an activity to look for opportunities for environmental learning in different learning areas. Teachers were expected to search for and record the following workbook activities in their portfolios:

1. *Describe how the described purpose, features and scope of the Learning Area lay the foundations for learners to contribute towards a healthy environment and better quality of life.*
2. *Does your Learning Area have any specific reference to environment in the learning outcomes and assessment standards? If yes, list these. If no, describe how you can use your school environmental programme to introduce an environmental context to your learning area.*
3. *Consider the Natural Science, Social Science or Economic and Management Sciences Learning Area: Describe how the core knowledge prescribed for this learning area can link to your school environmental programme*
4. *Describe how your school environmental programme integrates with the learning area that you teach.*(Schudel, Hoffmann, Wigley, & Conde, 2008b: 11-12)

This activity was scaffolded by course notes which outlined the environmental learning opportunities in the curriculum. These course notes were used to develop Section 4.5.2 of this thesis which describes the environmental learning opportunities in the curriculum developmental outcomes, content knowledge, learning outcomes and assessment standards.

In Social Science one teacher saw the opportunity to develop investigation skills "The children will be able to demonstrate historical knowledge and understanding e.g. what elders used to eat, how many times per day, where did they get their food?"(PortMM-LU2:12)

The discussion below is between the tutor and another Social Science teacher who initially did not find it easy to find environmental links in this learning area. She had identified nutrition as an issue in her school, but struggled to link it to the curriculum. She was looking for alternatives in the discussion below. The discussion illustrates how broadly environmental learning can be interpreted, yet the chosen issue of volcanoes was not feasible to address in a course with a transformative intent designed in order to help teachers address local issues in their school.

Teacher: I can do the environmental issue of ... what about those natural hazards?

Tutor: Natural hazards? Such as

Teacher: Such as ... ah ..volcanoes

Tutor: Are there any volcanoes in your environment and is there anything you can do about it if there was?

Teacher: No

Tutor: So is there any point in addressing those if you want to make a better environment?

Teacher: OK. ...So I need help. You can assist me with anything?

Tutor: Well I don't know your environment. I don't know what is important to you. You need to tell what is important to you in your community. That is the purpose of the picture-scope. Where you go and find out what is important. And then you do something about it ... hmm? Like when you came on to this course, what environmental concerns did you have? Otherwise you must stick with nutrition.

Teacher: How can I stick with nutrition. Because I am stuck, stuck. I am stuck really now. I am stuck.

Tutor: Right. I don't know. Maybe ..um ... How about [reads] "identifying challenges to societies and settlements with a focus on population growth and change"?

*Teacher: That is a beautiful issue. I can talk about those shacks.
[Discussion where they decide to use a questionnaire to identify challenges]*

Tutor: [tutor draws diagram and talks]. OK – so here you have got population growth, urbanisation and change ... um ... your change is moving from one place to another, it's factories closing, it's political change, all of those things kind of affected the situation. And they will find that out from their questionnaires. I think your questionnaires should maybe focus on particular families. Go to a family and find out when did you move here? Why did you move here? Were you satisfied when you moved here? What challenges do you face? How do you survive those challenges? Then ... your action requirement ... is they need to analyse these. They need to analyse the different ways of responding and maybe they can do a SWOT analysis?

*Teacher: Mmm. It sounds better now.
(RW2)*

In Economic and Management Sciences one teacher saw the opportunity for Economic and Management Sciences to "help to protect natural resources e.g. indigenous plants, *imifino* [wild vegetables] and fruit. In my school focus area is nutritious food which will be produced from the school garden. Sustainable growth of food garden will assist every child, teacher, parent". (PortMM-LU1: 12)

One teacher saw Geography's "Exploring issues" as an ideal learning outcome to use to explore environmental issues. She noted that they could: "acquire skills of identifying the school and environmental community issues or risks through field trips or audits" and "they could communicate and take an action plan to address the issues they discovered in their investigations independently". (PortXN – LU2: 11).

The following quote represents a teacher's thoughts about environment in different learning areas:

I've seen that environment encompasses all the issues in our lives. If you come to the Maths, there is an environmental problem. If you come to the Language, there is an environmental issue. ...we thought the environment was the one we can use to do the food garden only ... But ... we have seen it's not about the vegetables only. It's about all the other issues in life. You can do Arts and Culture. You can do Technology too with the environmental programme. (I1)

6.4.1.3 Environmental content knowledge in different learning areas

The following section presents discussions regarding three learning areas with no specified content knowledge, that is, Home Language, Arts and Culture and Mathematics. The discussions highlight the deliberations and the conscious and informed decisions regarding the introduction of environmental content knowledge into these learning areas. These extracts are from general discussions in Regional Workshops 1 and 2, which illustrate that teachers were constantly grappling with finding an environmental focus for their lessons throughout the course, despite the scaffolding activity described in Section 6.4.1.2 above. This is pertinent to active learning as it is important to carefully review how the introduction of an environmental focus furthers (not hinders) the aims of the learning area and deepens (not limits) “knowledge or process skills from specific learning areas” (Lotz-Sisitka & Raven, 2001: 67 – Section 1.3).

One teacher commented on the importance of good language skills in order to support learning in other learning areas: “whenever they are performing activities, speaking, listening, writing, readings and viewing or language structure and use are also vital for environmental learning” (PortNV – LU2, pg. 29). The Home Language Learning Area specifies the importance of using language to “engage with important human rights and environmental issues such as poverty, HIV/AIDS, the right to land, and consumerism” (South Africa. Department of Education, 2002d: 8). However, beyond this, no content knowledge is specified in the Learning Outcomes and Assessment Standards. The following discussion amongst a small group of teachers with a tutor considers the integration of environmental content knowledge in languages and indicates different emphases between the teacher who was emphasising **language use** and the tutor who was emphasising **using language to engage new knowledge**.

Teacher: I used a poster of a malnourished child.

Tutor: ... What key areas of the poster were you bringing up in terms of environmental information?

Teacher: They had to look at the child ... Why is the child in that situation? Some will say that the child is alone, the child is hungry.

Tutor: So you are using the poster to bring up the prior knowledge?

Teacher: Mmm.

Tutor: Now how to lead from that prior knowledge onto the unknown, the new knowledge? What else do you bring into it? So that poster is a good starting point to have discussion on what your learners know about malnutrition ... How are you adding on knowledge around nutrition that your learners don't know yet?

Teacher: I thought that in the lesson plan the thing I want my learners to know is how sentences should look like. ... My assessment standard was on sentence construction where punctuation is looked at ...

Tutor: OK. But now in terms of environmental information that they should get out of this lesson... because you have got to combine the two. Punctuation is one thing you are going to be assessing, but your environmental learning ... What do you want your learners to know at the end? Knowledge around nutrition?

Second Teacher: Your lesson has more emphasis on Language as the learning area, but giving maybe less emphasis on the environment.

Tutor: You have got to bring the content. ... The fact that your learners are achieving the assessment standard is one thing during the activity - that is one thing that is achieved. Then the other one is what environmental knowledge are they gaining out of this? New environmental knowledge ... What do you want them to know?

Teacher: You can teach environmental information at the same time.

Tutor: Yes! You can teach while you are talking about something else.

Teacher: But the problem comes with the environmental focus... You can teach about punctuation and the assessment standard goes with it, but ... what it is that you have taught your learners about environment?

Tutor: Yes. So how do you want them to know about punctuation? ... Maybe you can read them a story which they write about while you assess punctuation, but the content of the story is about nutrition. Things that they don't know... Nothing is wrong with your lesson because you are focusing on punctuation. You are meeting curriculum requirements, but also the environmental focus... So if you suffer from malnutrition what do you do? And then perhaps bring the kinds of different foods that learners should have in a balanced diet... The percentage of those foods....So that is how we can form decision makers, thinkers.(RW2)

Another discussion illustrates a similar difficulty with working with environmental content knowledge in the Language Learning Area.

Tutor: What about the environmental focus in your work?

Teacher: To be honest. Not that much. I normally fit it in Life Skills or Numeracy. Sometimes ... when I am doing the Language, I find that this week it won't fit. Maybe it will fit in next week.

Tutor: In simple instance like using the vocabulary...

Teacher: It fits.

Tutor 2: Just to start from there.

Teacher: I can do it. You know, but it was just like that even initially, but we were not aware then that we were using the environmental vocabulary or ... some sort. For Numeracy and Life Skills – it is very easy.
(I3)

The discussion below with an Arts and Culture teacher illustrates that despite the requirement in Arts and Culture for a focus on “physical, natural, social and cultural environments” in the Intermediate Phase (South Africa. Department of Education, 2002b: 11) and a distinct interest in different environmental concerns, the teacher struggled to imagine how to turn these opportunities into classroom activities:

Teacher: In the back of my mind I have brought articles on biofuel and everything that is going on ... We are not going to destroy the environment. Even this organic way we are taking – we are not going to use any chemicals. It is all organic.

Tutor: So you have nice ideas, but we need to think carefully about how you can fit that all together in one picture. Where you have your project – which is the garden, where you have got the environmental information and you have the curriculum outcomes all in one picture.

Teacher: That is where I am not happy with Arts and Culture. It is just ...

Tutor: A challenge. But you mentioned when you started your presentation that you know with Arts and Culture you can bring in any issue. And you can link it to drawing, poetry ...

Teacher: It comes and goes. When I think I have got it, it disappears.
(RW2)

An example of how environmental content can be brought into a subject with no explicit environmental content in the learning outcomes and assessment standards was discussed during the third regional workshop, yet the response from the teachers indicates that this was not initially easy to grasp (see discussion below):

Tutor: In Learning Unit 1 we looked for environmental learning opportunities in the purpose of the learning area. I'm going to find one quickly ... [looks in book]. OK – like “Language should be used critically”. It doesn't directly refer to environment but you can certainly see environment in here. It says we “need to understand the relationships between language, power and identity and to challenge the use of these when necessary. To understand the dynamic nature of culture and to resist persuasion and positioning. Environment is often linked to those ideas of power and culture and identity. OK? Wearing fancy Nike shoes are all about your identity – the youth culture wanting to have the latest and the most modern and ... the kind of throwaway culture that is quite common in our lifestyles at the moment and the lifestyle of youth. Am I right? Throwaway culture ... wanting the latest and the greatest. So that is about understanding power and identity and challenging and taking a critical look at these. So you can link that to environment.

Group: Yes [not convinced].

Tutor: And then if you start looking at the learning outcomes and assessment standards ... we need to think critically, alright?... Let me find an exact one so I can give my example [reads] “thinking and reasoning” is Learning Outcome 5 in languages. So ...[reads] “answers and begins to ask some complex questions” ... so ... if you are in languages, then you need to ask complex questions about the interrelationship between environment and human rights. We need to ask complex questions that are going to enable us to become committed responsible citizens ... we need to [reads] “express an opinion and give a reason for it”. So we need to express an opinion about human rights and social justice. We need to express an opinion about how we should be or could be or aren’t or whatever - committed responsible citizens. All right?

Group [some respond]: Mmm. (RW3)

In Regional Workshop 3, a teacher explained how she had worked with the mathematics data handling learning outcome for which data needs to be **analysed**. She suggested collecting and drawing graphs about eating habits at home and then asking the questions discussed below.

Teacher: Do we all in this classroom have a balanced food? No. Why is it not balanced? Maybe because my parents haven’t got money to buy? Why? Because we are not getting social grant³⁴ at home. Why don’t you get a grant? Once you discover that there are some learners in the classroom that are not getting a social grant, you intervene as an educator by asking the parent maybe to come to school or by inviting the social worker to come to the school and address the steps to be taken.

Tutor: Sometimes we tend to just look at the data and report it and stop there. But [teacher] is saying we need to take it further and we need to discuss the meaning of the data. What does it mean to us? What does it mean to us and our communities? And how can we make it better?(RW3)

6.4.1.4 The first principle as a guiding principle for all design features of the curriculum

The curriculum has the potential to lose its transformational intent if learning outcomes and assessment standards become the main focus of the lesson plan without a broader understanding of curriculum principles and learning area purpose and scope. The challenge of maintaining this transformational focus is evident in the following discussion between a teacher and a tutor where the teacher is trying to link the school garden project and environmental learning to the Grade 6 Economic and Management Sciences assessment standard “Identifies steps that can be taken by government to redress historic imbalances and poverty” (South Africa. Department of Education, 2002c: 25).

Teacher: The government can encourage communities to develop community gardens and can even fund them.

³⁴In South Africa parents without the means to support their children, as well as children supporting their siblings in child-headed households, are eligible for a child support grant (Section 1.6).

Tutor: But why is the government doing that?

Teacher: To eradicate this poverty.

Tutor: And what are the symptoms of poverty?

Teacher: It is not able to buy seeds.

Tutor: And what the symptoms of poverty on your health? How can poverty affect your health?

Teacher: You don't have money to buy food.

Tutor: And you can look at the effects of malnutrition. And now you link it to this:

"Identifies steps that can be taken by government to redress historical imbalances and poverty" and now you say: "Right – what steps can government take to address poverty and malnutrition"? (RW2)

By starting the curriculum work in the course with a focus on the first principle and following with an audit of learning opportunities in learning outcomes and assessment standards (see Sections 6.4.1.1 and 6.4.1.2), the course was implicitly setting up an understanding of assessment standards as emerging from learning outcomes, emerging from purpose of the particular learning area, emerging from the broad principles of the curriculum.

However, when lesson plans began to lose this 'emergent' understanding of assessment, and assessment became quite mechanistic, a spontaneous discussion arose in a regional workshop which resulted in the development of the diagram presented in Figure 6.7 below.

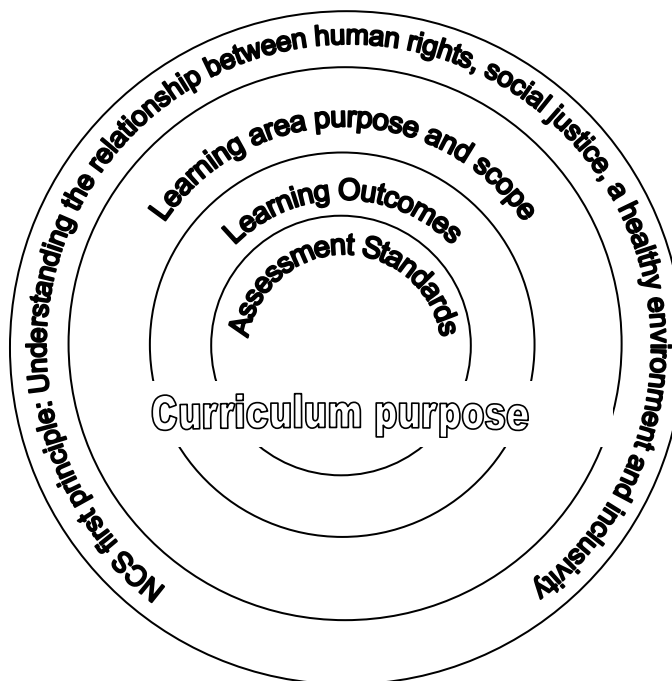


Figure 6.7 Diagram representing an 'emergent' view of assessment in curriculum work (redrawn from workshop flipchart notes - WN2)

After this explanation, some teachers appeared to understand the significance of the discussion as captured in the dialogue below:

First teacher: The assessment standards, they link with learning outcomes and learning outcomes they link with the learning areas (the purpose and the scope) and that purpose and scope – there is an interrelationship between [these and] the first curriculum principle.

Second teacher: There is a link – even from Grade 1 ...when you have that assessment standard, maybe in your questions, there should be something related to human rights and social justice – there ... yes.

(RW3)

6.4.2 Deliberating the knowledge focus

Section 6.4.1.3 highlighted the difficulty of deciding what environmental content knowledge to introduce to learning areas such as Home Language, Arts and Culture and Mathematics. Both defining a topic in these learning areas and elaborating on a topic specified in a learning area such as Natural Sciences is difficult in a curriculum where “content is found in different forms in different documents and at different levels of specificity” (Dada et al., 2009: 47 – Section 1.3) amongst teachers with poor content knowledge themselves (Section 4.5.4). In all learning areas, teachers still need to find appropriate detail regarding the topic to share with their learners.

The Schools and Sustainability course highlighted the importance of textbooks as:

A good source of foundational scientific and ecological information which can help you and the learners make informed choices about what constitutes a healthy environment, what alternative technologies are available, how we can design appropriate enquiries for investigating our environment and more.(Schudel, Hoffmann, Wigley, & Conde, 2008b: 18)

The following discussions represent the difficulty teachers had in identifying or finding appropriate new knowledge for their lesson plans.

One teacher wanted her Grade 3 learners to explain how recycling could contribute to environmental health (a curriculum requirement articulated in the assessment standards), but was not sure herself what the issues were. In a district workshop we looked at a teaching resource containing waste activities that she had been given as part of the course (see Figure 6.9). This illustrated a life cycle analysis for paper. I tried to adapt this in order to explain to the teacher how recycling and re-use might decrease air, water and solid waste pollution (see Figure 6.8 below drawn from workshop notes – DW1).

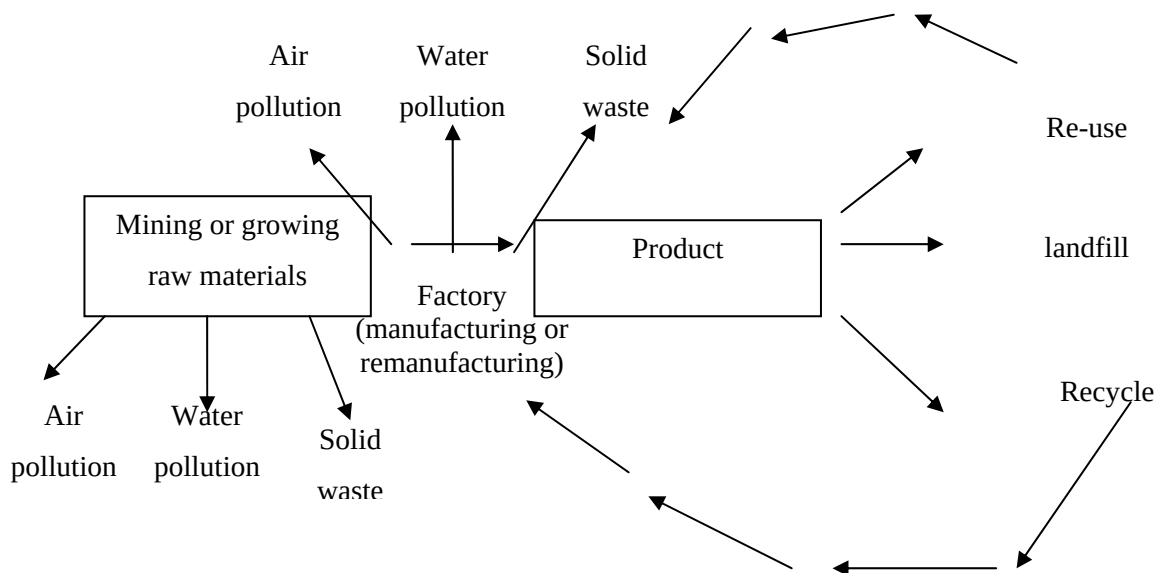


Figure 6.8 The effect of re-use and recycling on the extraction and manufacture of materials and goods

The teacher used the same cause-effect processes evident in this diagram, adapted for Grade 3 learners, to create the ‘poem’ below which makes an erroneous implied link between “dirty things” and tuberculosis³⁵.

*Dirty things
Thrown around
Cause germs
Germs cause diseases such as rash
And tuberculosis
(LP1NV)*

In the regional workshop a tutor made the link between foundational knowledge and the ability to make informed decisions in the following statement: “So they are making an informed decision because they learned through this lesson plan in LU1 that they need this range of foods to be glowing and healthy. You need to have foods for ‘glow’, ‘grow’ ... Yeah?” (RW3).

A Grade 4 teacher had a concern with sellers outside the school selling junk food to the learners. Her lesson plan originally consisted simply of their prior knowledge about healthy and unhealthy food, and an activity where they collected pictures from magazines to make posters categorising healthy and unhealthy food. For learners to simply list healthy and unhealthy food would be too simplistic for Grade 4s. During the workshop the tutor argued that new knowledge needed in order to understand the problem was:

³⁵Section 8.2.5 discusses how a translation from Xhosa might have led to an inappropriate link being made between litter and tuberculosis.

- Understanding the socio-economic complexities of the sellers' for whom the activity was a livelihood;
- Understanding why particular foods are unhealthy and others not.

This would set learners up to motivate for the selling of healthier food without compromising the livelihoods of the sellers (DW1).

The discussion below shows how one teacher relied on the learners for researching information that was not otherwise readily available:

Teacher: The first activity was to go and investigate litter – someone will go outside and look for litter that is lying there and she is going to investigate: What is it made of? Where does it come from? How can we reuse it or recycle it? So it is where we are with the learners. They are still collecting that information.(RW2)

In the case below the more complex question of where litter comes from seems to be avoided while the simpler (what could be prior knowledge for many learners) of what it is made of became the focus:

Tutor: So where the litter comes from? Is that part of it? You said they want to investigate where it comes from? What do you mean?
Teacher: They are going to investigate the types of litter like plastic, we take a plastic and we see what is this dirty thing made of? Where does it come from?
Tutor: What do you mean where does it come from?
Teacher: It is made of plastic or it is made of paper or if it is made of tin.
Tutor: So they only looked at what it was made of.
 (RW2)

6.4.3 Deliberating methods

In Learning Unit 2, teachers were asked to consider what types of quantitative and qualitative enquiry activities they could do with learners in order to explore environment and sustainability in their local environment. The following is a response from one of the teachers extracted from her portfolio:

Quantitative enquiry:

- * *How many metres³⁶ of water have been used today at school in the metre box?*
- * *How many litres of water can you measure today?*
- * *How much water was used at home by your family and you yesterday? What was the water used for?*

Qualitative enquiry:

- * *Which methods can be used at home to manage water run-off from the roof?*
 - * *How/which ways can we use at school to collect or manage rain water at school?*
 - * *How can we use water more economically with less expenses at home or at school?*
- (PortXN-LU2: 7)

³⁶Here the teacher erroneously used the term 'metre' instead of 'litre' to refer to the unit of measurement for liquids.

In thinking about how she would apply these ideas, the teacher explained (with due consideration for scientific rigour by making sure that comparisons were only made between households with the same number of people) that:

The learners who are having the same number of family members in a household will be grouped together to compare whether they have used the same amount of water at home, they compare the municipality bills from various household with the same number of people living in. (PortXN-LU2: 7)

The discussion below is one between tutor and teacher where the tutor commended the visual representation of waste volumes (Plate 7, Photograph 27), but suggested that learners could measure the amount of waste and represent it graphically with more mathematical accuracy.

Tutor: You make it a little more scientific, because it is nice for them as a Maths exercise – instead of just drawing – there is less. Why not take a ruler and measure – or take a piece of string and go up to how high it is – you know ... Instead of just drawing lines and stripes, maybe they can actually write what is in the bin. What type of waste is in the bin? Because you can see here they have got circles and stripes and there they have got a scribble and there they have got stripes. Why is that stripes and that scribbles? Makes you wonder ... can we make them think a little more scientifically?

Teacher: So, in the form of graph?

Tutor: I like the picture – it is different. It is nice in terms of – this is the volume – you know. So I don't think there is anything wrong. But yes, you could turn it into a graph. The nice thing is that you can still make this scientific by writing the different types of waste. So here will be bottles, papers, plastic, sweet wrappers. And the next day there will be sweet wrappers, plastic, but there won't be bottles. And the next day you will have less things, and the next day ... so you can actually see it pictorially – quite nice – you can also do it in a graph.

Teacher: Because to me it is very difficult to draw these things.

Tutor: Ja [yes]. But they could write the words.

*Teacher: Oh the words. OK.
(RW2)*

The statement below illustrates that the teacher in question is prepared to elaborate on what she is given in terms of activity detail and that she appreciates the opening ideas given to her in resources.

You see, there is a book that I've got it at the Wildlife Society. It's about "Waste". It just states the learning outcome, the assessment standard and it will give you – small (emphasis) activities. Then it challenges you to make the flesh out of that, but it has given you the clear starting point. So it is now for you now, not just to fold your arms and say – ah - Ingrid is going to give me a resource ... (Laughs). So, there is nothing – I am going to do it ...(11)

6.4.4 Learning and Teaching Support Materials

With reports of textbook shortages (Sections 1.4, 4.3.4) and difficulties with the adaptation and use of learning and teaching support materials (Sections 1.4, 6.3.3.2); the provision, selection, adaptation and use of teaching and learning support materials to extend and deepen environmental content knowledge is a significant consideration in environmental teacher professional development programmes (Sections 6.3.3.2 and 6.3.3.4). Section 6.2 explained how Learning Unit 1 in the Schools and Sustainability Course was structured to responsively either provide, or help teachers to find, relevant learning and teaching support materials to support their chosen environmental focus. This is evident in the following Learning Unit 1 workbook questions posed to teachers after they had chosen an environmental focus through the picture-scope activity:

- *Describe the environmental focus that you would like to continue with for the rest of this course.*
- *Describe what you and your learners already know about this focus*
- *What information do you need in order to expand your understanding of the focus?*
- *Find this information and describe and reference (author, date, title, publisher, place of publication) what you have found.*
- *Describe how would use this information in lesson planning activities.* (Schudel, Hoffmann, Wigley, & Conde, 2008b: 20)

This activity was used in the course to identify gaps where teachers had been unable to find relevant information and tutors were tasked to provide relevant materials. An example of one of the materials provided to teachers is shown in Figure 6.9 below. This is a resource pack on waste with a number of information sheets on particular aspects of waste and waste management.



Figure 6.9 Waste resource pack given to teachers focusing on waste to support resource-based learning

This section presents course deliberations and interactions regarding the selection, adaptation and use of learning and teaching support materials.

6.4.4.1 Availability of learning and teaching support materials

This section presents data relevant to the ongoing problem of textbook shortages in South Africa as evident in Harley and Wedekind's 2004 report that "52 per cent of schools are inadequately supplied with textbooks and ... 83 per cent of schools do not have libraries" (2004: 200) stretching to current reports of cases where there is only one textbook per three learners (Hendricks, 2011 – Section 1.4).

In the 2008 Schools and Sustainability Course, one teacher explained a general classroom challenge that: "There was a shortage and non-availability of books. I did a lot of photocopying" (PortMM-LU4, pg. 41). The same teacher explained a problem both with textbook availability and the language of textbooks which need to be translated for young Xhosa learners: "We didn't get textbooks. At all ... for example [brings out book] ... this is Life Skills learning material ... It is good. We are sharing this. We are three teachers. And then children don't have this. So we have to translate every time" (I5a).

A second issue reported in this section is particularly pertinent to a situated approach to active learning and its need to help teachers and learners deal with "complexities, nuances and controversial aspects as they are played out in local contexts" (1997 in Stevenson, 2002: 193 – Section 4.4.3) and which aims to support "open-ended processes" (O'Donoghue, 2001: 7 – Section 3.2) in a way that enables "a diversity of responsive and flexible curriculum processes" (Tlaleane in Lotz, 1999: 20 – Section 4.4.1).

The following discussion illustrates the concern of the course tutor with the Schools and Sustainability Course's ability to provide a broad range of learning and teaching support materials in a course that is responsive to local and open-ended environmental concerns.

Tutor: So you didn't feel disappointed that the course hadn't given you the content?

Teacher: No, I didn't ...

Teacher: The knowledge you needed?

Teacher: No

Tutor: It is important you say if you don't. The difficulty with environment is it is so broad and always what we try to do is to encourage teachers with the skill to find the knowledge. But sometimes I wonder if that is actually feasible. Do the teachers have access to the kinds of knowledge that they need from the textbook, from their prior knowledge or from other courses? Or do we need, as the Schools and Sustainability Course, to also give guided information about different soil types, how to make compost, how to do a trench garden, how to audit water, how to save ... you know – all of those kinds of things – there is so much in environment that in a short course, we thought well ... we must rather teach teachers to find the information and to make the connections ... so that is one of our challenges.(I3)

The important role that the district tutor as a Department of Education district official played in providing contextualised learning and teaching support materials is illustrated below:

Ingrid: What about learning and teaching support materials? Have they been sufficiently supported?

Nomsa: That is a problem. That area is a problem because even when they have to choose other focus areas, we will need to supply materials. Sometimes I have to photocopy for them, but I am – it is not as – it is not enough. It is not enough. They need support materials for them to understand the content of their areas. I think that is a challenge. (Tut11)

Talking about the course resources that were supplied one teacher commented

The resources you gave us. They carry information – you know. So these resources helped me so much. Especially the Lesson Planning Booklet. So we use the resources that you gave me. We used to photocopy them. Even the templates of lesson plans and assessments. Then even though we have some, but we used to compare and pick up and try new things. (I2)

The booklet discussed here offered a series of exemplars illustrating particular environmental learning interests such as working with the South African principle of the relationship between human rights, social justice, a healthy environment and inclusivity (NEEP-GET, 2004).

6.4.4.2 Value of textbooks

This thesis has reported that a de-emphasis on textbooks in the 1998 ‘Curriculum 2005’ (Dada et al. – Section 4.5.3) led to a concern raised by Lotz-Sisitka and Raven that teaching without textbooks “led to the design of activities that were mostly reliant on what learners knew, or could deduce from a particular environment (2001: 47 – Section 4.5.3).

The following data illustrates the tension between an over-reliance on textbooks with limited development of environmental concepts (Raven et al., 2005 – Section 1.3), while at the same time needing to rely on textbooks to guide teachers in maintaining the conceptual progression of the subject (Section 4.5.4):

- One of the teachers in this research used textbooks extensively. It was notable how the textbook extracts used in her first lesson plan represented a variety of skills: Listening, reading, writing and researching (XNLP1).
- Another commented that despite the reduced emphasis on textbooks with the new curriculum “it is wise to use textbooks that work” (TCP18).
- This discussion about the content of textbooks illustrates that textbooks can be helpful (to a certain extent):

Tutor: Do the textbooks give you enough information about the complexities of the environmental issues that you are facing?

Teacher: No, they are not 100%. I cannot say they are 100%. But the content I want – if I want to do whatever, they can help. (I3)

6.4.4.3 Developing own learning and teaching support materials

Section 4.3.3 reported the Norms and Standards for Educators vision of teachers in the role of “designer of learning programmes and materials” (South Africa. Department of Education, 2000: 13). In Learning Unit 2, the Schools and Sustainability course emphasised the development of qualitative and quantitative tools for local enquiry (Section 6.4.3). In other cases teachers developed their own materials in response to needs arising during lesson plan development.

This section reports on the variety of learning and teaching support materials developed or adapted by teachers themselves:

- Stories (LP1NM, LP1NS, LP1MM, LP1NV) (developed with encouragement from the course tutor Nomsa (Section 6.4.4.1)
- Song (LP2NS)
- To facilitate the auditing of eating habits in the community a teacher designed her own enquiry worksheet. She explained how she had drawn on information about how much water one should drink and how many different food types one should eat each day in order to construct the enquiry (I3, pg. 14). This audit sheet was designed for ease of use by young learners and had pre-determined answers that learners needed to tick – this enabled her to get around the language limitations of Grade 1s (I3) (see Plate 11, Photograph 42)
- Flash cards (LP1NV)
- One teacher designed posters by taking photos of and labeling two different sections of the garden (see Plate 15, Photographs 55 and 56)
- One teacher designed a poster on waste to facilitate classroom discussion (Plate7, Photograph 26)
- Another teacher made a poster to show how a compost heap is made – using real compost ingredients

6.4.4.4 Teachers seeking out necessary learning and teaching support materials

Section 4.3.3 reported the Norms and Standards for Educators vision of teachers in the role of “scholar, researcher and lifelong learner” (South Africa. Department of Education, 2000: 13). The Schools and Sustainability Course supported the development of this role particularly considering the

context of 'new' environmental content knowledge discussed in Section 4.5.3. Learning Unit 1 supported teachers in reflecting on what information they needed and where they would find it (Section 6.2). This section presents Schools and Sustainability Course deliberations and interactions regarding accessing and working with learning and teaching support materials.

In an example of a teacher sourcing her own materials, one teacher asked for a book on indigenous wild vegetables which she had asked the tutor to copy for her (ONS1).

In another example, a teacher explained how she sourced learning and teaching support materials from other teachers as well as through library and Internet research. Her comments follow:

So I am enjoying doing the flash cards. I used to go to the library and ask from other educators. For instance those – that alphabet and those phonics – I ask someone to give those to me. The lady who is in the project – it was a project – so they gave them – the resources. So I asked the lady and I photocopy it for my learners. I used to buy some of the pictures. (I2)

Later she added:

I haven't enough knowledge. As a result I used to search for myself in my library. And sometimes I use the Internet. I haven't got at home, but at school. (I2)

Another teacher gathered information from many sources but was limited by funds even for low cost materials:

Tutor: So for last year were you short of any particular resources around a particular issue or anything?

Teacher: I managed to use the library. But the library is far away. I can't get the children to go to the library, so I do bring things sometimes.

Tutor: What kinds of things?

Teacher: Like charts, like books...

Tutor: Charts on?

Teacher: Last year we were doing healthy living and nutrition, nutritious foods, [the Wildlife and Environment Society] provided us with some materials like trees, herbs, and all that knowledge and information about that.

Tutor 2: And some Share-Net books?

Teacher: No, we have not received yet. I only got it from May so those are the books I thought we are supposed to get from Laura [the tutor]. Maybe we are still waiting.

Tutor 2: You need to order.

Teacher: We don't have money.

Tutor 2: Those books are not expensive. They are R20.

Teacher: In my community R1 is a lot.

Tutor 2: From the school.

Teacher: From the school budget? School budget we are still waiting funding for this garden. That is why it is like this. (15a)

The following figure illustrates a teacher trying to make sense of new information by making her own notes and highlighting relevant information. Figure 6.10 below is a copy of the notes the same teacher made on the sources of different traditional foods (names in Xhosa).

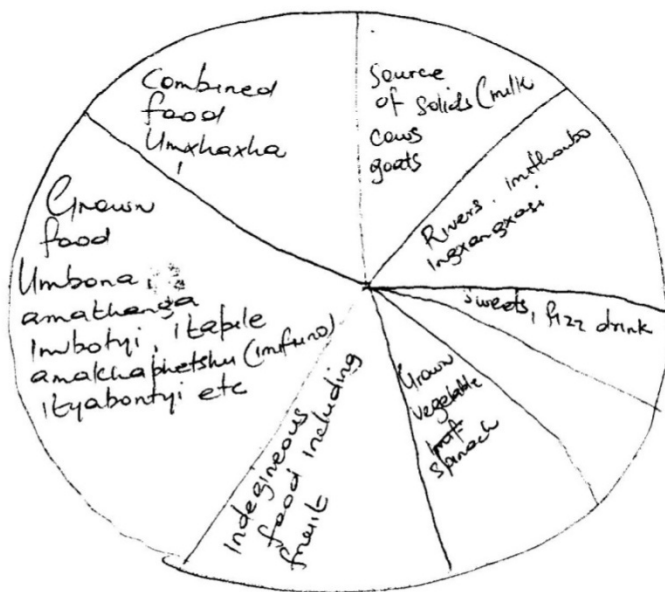


Figure 6.10 Notes made by teacher on the sources of different foods

6.4.5 Deliberating assessment challenges

Section 4.5.6 reported difficulties teachers had with designing opportunities for learners to realise the knowledge, skills, attitudes and values (SKAVs) embedded in the learning outcomes and assessment standards and with designing assessment activities that would enable them to judge how well these SKAVs have been met (Mambinja, 2008; Ncula, 2007; Schudel, 2006). In order to respond to assessment challenges, a substantial part of Learning Unit 3: “Assessment for Learning and Planning Environmental Improvement” focused on assessment.

The following extract from one of the Learning Unit 3 workbook activities illustrates the emphasis on providing a strong link between course activities and assessment criteria in assessment work:

However you decide on your assessment criteria, the important thing is not to lose sight of the Learning Outcomes and Assessment Standards that you have set. Do the activity in Appendix E where a number of rating scales are compared. You will see from these examples how important it is to relate the criteria in your assessment tools to the learning outcomes and assessment standards. For example, there is no point in focusing criteria on group work when you are trying to see whether learners have achieved a Learning Outcome related to scientific investigation.(Schudel, Hoffmann, Wigley, & Conde, 2008d: 5)

Section 4.5.6 highlighted Shipway's concern that the positivist mechanism of standardised testing "reduces the totality of students' knowledge to what can be (positivistically) known about students' knowledge" (Shipway, 2001: 136). In response to the potential for such positivist implementation of assessment, the Schools and Sustainability Course highlighted the importance of embedding the transformative intent of the first curriculum principle in assessment work (based on the understanding that the assessment criteria emerge from the curriculum intent as illustrated in Figure 6.7 above). This is evident in the following pointer made to students in one of the Learning Unit 3 workbook activities: "Ask yourself: "Do my assessment criteria provide benchmarks for assessing whether learners are acquiring the skills, values and in-depth knowledge needed to improve the world they live in?" (Schudel et al., 2008d: 5).

The following extracts highlight some of the discussions raised and portfolio reflections noted during Learning Unit 3 of the Schools and Sustainability Course:

- One teacher illustrated that she had heeded the important point made during the course that there must be a link between chosen activities and assessment standards: "There is one thing on the mind when developing a lesson plan. Assessment Standard must inform the activities" (PortNM-LU3: 52).
- Another teacher pointed out: "I would like to improve the selection of assessment standards, to choose one at a time and also the proper way of assessing" (PortWG-LU3: 41).
- The tutor pointed out that assessment is there to help teachers to judge whether their environmental activities are actually challenging learners enough (RW3).
- In response to discussion during a regional workshop about designing criteria for rubrics one teacher commented: "Just an input. I advise that when you are doing the rating scale, you look for the keywords for the assessment standard" (RW3).
- In discussion a tutor pointed out: "You need to be careful about not being too ambitious – you need to focus on one learning outcome, one assessment standard" (RW3).

The Schools and Sustainability Course supported the development of detailed rubrics for assessment purposes (Schudel et al., 2008d). The extract below demonstrates both the positive side of detailed

assessment which can respond to superficiality in assessment, as well as the potential to become reductionist and end-oriented in a search for ‘objectivity’ (Scott, 2000: 66 – Section 5.4).

When supporting the design of rubrics, a tutor commented:

The rubric is more objective and it looks into the child. As according to what the child has been able to achieve – or how the child has been able to respond. ... Exactly – this tells exactly what the child has done. ... Somewhere you must vary the tools. Eh? This is what you said, because some of them are only superficial and the others are more elaborate. You get to see the child well. (RW3)

Another problem with detailed assessment is the concern with the reported heavy workloads expected of teachers – one of these related to assessment complexity (Dada et al., 2009 – Section 1.5). The discussion below illustrates that even though teachers may appreciate the value of, and be competent with, the development of their own assessment tools to assess learning outcomes; the workload is heavy:

Tutor: Excellent checklist. Did you manage to do that for all your learners? I did think it looked to me like quite a lot of work? That is why I was thinking – did she really do that for all 29 learners?

Teacher: Yes, that is the workload I was talking about. I asked my child ... to write this on her computer at school. I wanted to show my group [the cluster of teachers she was working with], that is why I planned it.

Tutor: This is fantastic.

Teacher: I was excited when I was doing Learning Unit 3.

Tutor: Good.

Teacher: Yes, I was. Because I could see results from the learners and I was excited about what we are doing. I could see that we are going somewhere. (I5a)

Another issue that was raised during the course was the difficulty of assessing group work:

- A teacher commented: “Most of the time we work in groups because of scarcity of worksheets making it difficult sometimes to assess each learner’s performance” (PortMM-LU3: 41).

Despite the high emphasis on assessment, the tutor (and district official) still felt that assessment was one of the key challenges that she still needed to address in her role of supporting teachers:

I think one also still has to support them in a recording of assessment – ratings ... how to rate continuously you know and taking care of both informal and formal assessment ... I think they still need support there. I have to support them in lesson plans and then assessment. Very seriously on assessment. And using the tools – and also some of them have indicated that they have used the rubric, but you don’t see the rubric. ... In the design of assessment tools, they need assistance. And how to implement those in class also. (ITut1)

6.4.6 A practice-based discourse

Section 6.2 described how the inclusion of a responsive action in lesson planning was expected of teachers for Learning Unit 2. In order to support this I ran a paper-making workshop to illustrate an example of an action related to waste. This was in response to the interest amongst many teachers participating in the course to develop lesson plans with a waste interest. This action was included in addition to the examples of actions suggested in the Learning Unit 2 workbook – Appendix P.

Teachers were expected to think about appropriate actions in the context of their own environmental concerns and school projects.

The discussion below highlights how environmental projects in the school may require working beyond minimum curriculum requirements. This is particularly in relation to practical action in response to issues and problems and is illustrative of the “practice-based discourse strongly focused on local, real issues” described by Ramsarup, (2005: 86 – Section 3.3.2).

Tutor: It relates definitely very much to the curriculum. So you are absolutely right in curriculum links. ... They say that the assessment standards are the minimum but you can go beyond the assessment standards. So what I am doing is putting the curriculum in the life context. OK. So, you know. Is it not a problem that we teach learners: You should eat three vegetables every day and they go home and their parents can't give them three vegetables?

Teacher: Even one.

Tutor: That is a problem hey?

Teacher: Mmm.

Tutor: So ... the curriculum doesn't promote action. Remember we did that activity where we looked for action possibilities in the curriculum? And I think people found them, but it usually means going a little beyond the basics of what the curriculum is telling you. Do you agree?

Teacher: Mmm.

Tutor: So a lesson plan can go beyond the curriculum and in this case you would have to go beyond the curriculum to get an appropriate action. ... As an example – where they have sellers who sell sweets and things, an action would be to go to those sellers and say: “We want a fruit day every Friday. We don't want you selling any sweets on Friday. We want to be able to make a choice. The right choice. Or – you might need to talk about – well – how can they get imifino [wild vegetables] into their diet? Can we grow it in the school? Can we find an easy place to collect? Can we find a club like the girl guides – go as one of their club activities to collect imifino from a place where they know it grows and add it to the school feeding scheme? Some kind of action like that where it directly deals with the problem. Because the problem might have been in the beginning that they didn't know what was right. Now that they know what is right, they can't do what is right.

Tutor 2: But really the action would be the culmination of the whole thing and then it would bring out a project to sustain. It does not necessarily have to tally with the assessment standard. As long as you have an activity that tallies with the assessment standard. You see? That you can assess. And your action goes along as the winding up of the programme on nutritious food and then leaving a project that will carry on.
(13)

The two cases presented below illustrate that the challenge of integrating practical action into curriculum work (as posed above) was successfully met in some cases.

In the third regional workshop a tutor shared a discussion she had had with one of the teachers with the rest of the course participants. The teacher had explained to the tutor how Economic and Management Sciences (EMS) was used to influence a successful fundraising effort in her school.

Tutor: I have seen evidence of so many wonderful activities in the garden. Particularly garden activities. Some lovely activities that we shared today ... Of growing and selling herbs, their class actually made about what R270?

Teacher: They made money.

Tutor: So they actually did a wonderful activity where they grew herbs and sold them. They borrowed R50 to do it and in the end they made a profit of about R270?

Teacher: Yes.

Tutor: And it was all a big Economic and Management Sciences project which they wrote up, explaining their profit and their borrowing and everything. So there is a wonderful example of how nicely this learning area links to the actual environment.
(RW3)

There is one teacher who distinctly made action central to her lesson plans as evident from this discussion below:

Tutor: It is interesting because they say that one of the most important skills is to be able to apply your knowledge in the real world and for me this is what I saw you doing.

Teacher: Yes. It is also identifying the problems and bringing solutions to those problems. Like my class has done.
(16)

6.4.7 Interactions as an educational community

Having opened up the question above of the relationship between curriculum and environmental action projects in schools, the following sections outline some of the interactions within the school, between school and parents and surrounding residents, and between teachers and the Department of

Education district officials. That is, with respect to supporting both curriculum requirements and environmental action projects.

6.4.7.1 School-community relationships

Section 6.3.1 explained how the Schools and Sustainability Course had explicitly excluded the development of the Eco-Schools activity which required the development of a school environmental policy and action plan as a task to be assessed in the course (Table 6.2). This is significant to active learning given the emphasis on the role of whole school development in supporting a deliberative and co-engaged approach to active learning through whole school development which “integrates the formal curriculum, social/organisational aspects, institutional practices, evaluation and community links” (Shallcross & Wals, 2004: 1). Despite the de-emphasis on school environmental policies as part of the assessment process in the Schools and Sustainability Course, participating teachers were encouraged to register their schools as Eco-Schools with the vision that their improved lesson planning would contribute to Eco-School whole school requirements (Section 6.3.1). Even though there was marginal success in completing the Eco-School requirements amongst the six cases studied in depth for this research (see Sections 7.2.1.1 – 7.2.6.1), early in 2008 teachers reported that they had started the Eco-Schools process of setting up an Eco-committee (DW1). Thus, there is evidence that teachers had begun to develop school-community relationships to support environmental projects in their schools.

Some arising challenges with school community relationships are highlighted in this section. The following three quotes highlight a need to consider questions of how parents are approached to become involved, and the extent and type of involvement in the school. In one case a teacher commented:

One of the things that I think we need to recognise and acknowledge is the importance of the parents in the classroom. When I was [studying] one of my electives was parental involvement. The willingness. I found that parents are willing to come to school and help. The only thing they don't like about us teachers is that we call them when we have problems. We call them when their children have done something. We call them when we need money from them. You know? [laugh]. (I5a)

Building relationships and clarifying expectations was one of the challenges expressed regarding the involvement of community members and parents in school initiatives. With respect to this a tutor explained:

It is not very easy to rope parents in. That must have been challenging because they must make sense of what it is and join in and show interest. It has not come to the stage exactly when – the ultimate stage where we want to be because they think they come for the garden only and we want them to be involved and ... so that it can be some kind of

whole school development. So that they are not only looking to the garden – all affairs of the school, they must take part. I think we are getting there. (Tut11)

An additional comment on this was that the need for parental involvement depends on the project in question:

Maybe there would be some projects but I was thinking of the garden for instance – when the schools close they need the parents to be part – especially where there is no caretaker. And then with some projects like for instance a waste recycling project this project can be done without parents really. It depends on the project. (Tut11)

Another concern with school-community involvement is the question of who is responsible for addressing environmental issues in the school and surrounding community. For example, one teacher explained:

I would like to continue with water waste. But the learners in our school and community members do not own the responsibility to eliminate water waste in our environment. They think it is the duty of the key educator, or environmental committee, the caretaker, people employed by the Buffalo City Municipality to eliminate this problem. Taps are vandalised by community members in our school and community by stealing copper to generate income for themselves. (PortXN-LU1: 20)

In this same community the teacher had the experience that:

There is no ‘manpower’ to run the projects. We have tried to get the community involved, but because of extreme poverty, they are not prepared to work for no remuneration. There is Food and Trees for Africa who have delivered trees for the community. Members of the community were flocking to the school because they heard that they could get R140 for delivering the trees. We gave members of the community land in the school to grow vegetables and we gave them seedlings as well. That was unsuccessful because one of the community members disappeared with all the seedlings. (I6)

Another teacher explained how after the learners had drawn pictures of intermittent water supply in the school they had taken up the issue with the municipality which had responded accordingly:

Here are some of the drawings [of intermittent water supply]. The SGBs, together with the community we all came together. So we have decided we better go and call the municipality. So immediately the municipality came. Then from there we asked the municipality: What can we do? They found that the meter is old and it needs to be taken out. That is why sometimes the water does not come out. So they put – they fitted a new one. So immediately at least now the problem of the water coming in drips and that sometimes we don’t have water – was solved. (RW2)

Another concern with school-community relationships is the tension between learning about what ought to be and what is possible in the home environment. For example, one teacher, after working with learners around environmental issues raised the question about how effective their new knowledge and skills would be in their community by asking: “Will they get support from their homes and community” (LP1WG)?

Another teacher's point emphasised the long process required in order to improve school-community relationships: "It is a process to improve the natural environment because, seemingly, the cooperation between the school and the community is not in good condition" (PortXN-LU3: 54).

The discussion below highlights the difficulties associated with lack of security for trying to establish projects in a school:

Tutor: You had those two trees and you were worried about planting them and you were unsure whether to put them in the community garden. What happened to those trees in the end?

Teacher: We have put it in the community yard, and the principal said, said let us do this arrangement – once we have fenced, those people are going to pay for the trees, because you cannot take it out, because it will be too big, to take it out. So we have got that project. Even the other seeds that we have got from [the Wildlife and Environment Society] we have sown it in garden ... There is a mother who is a bread-cutter here. She has got a garden and she is not using that garden, so we decided to use that garden. Yes, so she doesn't have any problem.

Tutor: So who looks after the garden?

Teacher: It's me, but not frequently. Her, the mother, and then the husband and some boys here at school, because we tell the boys that this is our garden. They must water them, water it, and take care of it.

Teacher: And is it doing well?

Tutor: Yes, but we have planted potatoes and the trees. We haven't planted these vegetables that are easily eaten by the animals and ... (I1)

6.4.7.2 Internal school relationships

Besides developing school-community relationships, Eco-committees are also important to teachers for garnering support from fellow teachers. This section presents the challenges for the Schools and Sustainability teachers in this regard, namely the perception of extra work and support from school management structures. It also presents a strategy used by one teacher who made sure her colleagues understood the benefit of the Schools and Sustainability work to the whole community.

This need is evident in the following concern voiced by a teacher: "I fear that if other teachers in the school are not involved in such programmes, what I am engaged in will be useless" (LP2MM). What is going to happen to my children in grade 2 if the next teacher is not inspired by the work already done" (PortMM-LU3: 54)? However, this was not always easy as expressed by one teacher who commented at the beginning of the course she "experienced problems with my colleagues in engaging them but now [towards the end of the course] they are co-operating" (PortWG-LU3: 53).

Towards the end of the course this teacher explained how she had included more teachers through talking about and sharing her knowledge with others who at first appeared reluctant to get involved. She related that:

Now even the other educators [are getting involved]. The time we started they used to say “No, no, no – don’t tell us anything. It is a lot of work. We don’t want any additions”. But as I used sometimes even during our break times – I used to stand up – they say: “Oh – it’s Weliwe”. Not necessarily to present it as a formal thing. Sometimes informal during break time I talk about environment and so on. (I2)

Another teacher shared the strategies she used for involving her peers more. She explained that: “Last year nobody wanted to be involved. I think this year we are going to work together. We are going to start from there because I have made photocopies of all the material that you have given us. So we are using it” (I5a). This same teacher commented how she thought other teachers could be inspired:

I would love some of the teachers to be involved in that course. That would be a help ... I also would like to bring in some of the teachers who have gone this route in their schools. Just to inspire our teachers. We have talked about inviting you, Sasa [Nomsa] and everybody else when we observe those environmental days. When they see that it is not about me. It is not about me, it is about community, it is about school, it is about children getting something out of it. (I5a)

In 2010, in a second interview, this teacher’s enthusiasm had clearly been challenged to the point where she appeared to be losing confidence in the possibilities:

Teacher: I am not more involved because I am busy now – you know than last year. Another thing, There is no support, especially from the top ... I don’t want to talk about that.

Tutor: It is important in understanding because it sounds like you are struggling with keeping up the work.

Teacher: Yes, I am. Very much so. I am struggling with this.

Tutor: Because your garden was beautiful last year.

Teacher: As a result I ask myself: “Why am I involved with this in the first place? Why?” [whispers]: It is a long story . It is a long struggle. (I5b)

However, this teacher was studying at the time and it is notable that her school registered as an Eco-School for the first time in 2011 (see Section 7.2.5.1).

An oppressive principal-teacher power relationship became evident in one of the cases where in a telephonic conversation with one teacher, she revealed that she was not able to register for the Advanced Certificate in Education (Environmental Education) course at Rhodes University as she felt that she would not get the support of her principal to do the school-based tasks (IC1).

6.4.7.3 Peer support across schools

Section 6.3.2.1 introduced the notion of a spiral approach to cluster-based teacher professional development. The value of teachers on the course working together as a supportive cluster is evident in the explanation of how they helped each other in clarifying issues and collecting materials considering that they all lived far from King Williams Town where they had their meetings:

We met two days for each session. So, sometimes you think you understand this – you go back to your school. When you start setting up “This is not the way I think it was”. You go back to your classmate to find that they are also struggling. You ask someone to phone the tutor and the tutor was getting our phones now and then. [Nomsa asks for clarity] I used to say “Nokhanyo – you are close to KWT – please ask this thing to Nomsa” ... “Stota – you are not far from KWT – please ask this thing from Nomsa because I am from Peddie. Much as I pass KWT it’s already past 4. So it was something like that. It wasn’t the duration. (I3)

Teachers worked together in their cluster to develop learning support materials such as the stories they wrote in order to introduce their learners to key concepts regarding the environmental focus of their lesson plans (I3, I5a). These cluster-based approaches were clearly valued by one teacher who commented: “If we can work together to do work schedules together and then you know for example this week you are going to teach this, you can support each other, you can share ideas ... We are trying. I think we are going somewhere.” (I5a).

6.4.7.4 Tutor and partner support on the course

This section presents reflections on the role of the different partners in the course (Department of Education officials, myself as the Environmental Education and Sustainability Unit representative, and WESSA staff) in supporting teachers with motivation, organisation, monitoring and practical support.

Firstly, a number of comments indicated an appreciation and valuing of the role played by the Department of Education District Official (Nomsa) in the course. For example, in the district workshop I attended, I noted: “In general I was struck by the teachers’ respect for Nomsa and valued having a Department of Education person supporting the programme. Nomsa was firm but friendly with those that arrived late” (DW1). This leadership style in ensuring teachers were productive in meetings became evident during an interview where a teacher was comfortable to comment in her presence:

Teacher: Yes. Nomsa was very strict to us.

All: [laugh]

*Teacher: She wanted everything. You cannot say – I have this lesson plan somewhere. She wants to know where it is – you must **bring** it. (I5a)*

Another teacher's appreciation of Nomsa's role is evident in the following comment:

It is fortunate to have a person like Nomsa. I am not giving her her credit. You see Nomsa is our resource. Any time we want something, you go to her office and you tell her your problem ... "I am still struggling about the lesson plan. I am still struggling about the designing of the learning programme". Then she said – no – I am gonna organise a workshop so that we can do it as, you know – as a cluster - as a District. If you can see my file, this year ... it was not like this in previous years. I did have it but ... it was just ... eh ... jumbled ... We did have information, but we didn't know how to use this information ... (I1)

Also the role I played in supporting tutors as well as making school visits as well as the role of WESSA as partner organisation appeared to be appreciated as implied in the following:

- After I attended a district workshop, Nomsa thanked me profusely and said it had helped a lot having someone else to work with the teachers so that we could give them more individual attention (DW1).
- A teacher reflected that "monitoring from Rhodes and WESSA was great" (LP3NS).
- "Fortunately for me you have asked us to present to you so that you can assist and develop where our weaknesses are" (I1).
- "They have had a lot of advice and practical help from WESSA (such as providing grass for mulching) which seemed much appreciated and which helped to make a difference" (OMM1).
- The tutor commented that WESSA "supplied us with seeds. So I wouldn't say there was a challenge of acquisition of resources... They have had resources. They got trees. They got trees for their schools and then they got the seeds" (TutI1).

6.4.8 Teacher identity

Section 7.2 reports on the role that teachers see for themselves in the respective "Teacher and classroom contexts" sections in relation to the Norms and Standards for Educators policy document (South Africa. Department of Education, 2000 – Section 4.3.3). This section reflects on how some of these roles are reflected in teachers' dispositional identity (Bhaskar, 1993 – Section 2.6.1) and how this dispositional identity manifests as rhythmic identity (Bhaskar, 1993 – Section 2.6.2) in terms of what teachers do in their classrooms. In this section data is presented which relates to teachers' roles in terms of their dispositions and actions, focusing firstly on the role of researcher (including the skill of reflexivity which was argued in Section 4.4.4 to be important for a deliberative approach to active learning processes). Secondly, the section focuses on the pastoral role of teachers in school and community which is significant in reflecting on a transformative approach to governmentality (Section 4.2.2).

One teacher indicated her commitment to her role as ‘researcher’ through noting environmental concerns in national media and her ‘pastoral’ role in the community considering the importance of her work as ‘good for us’:

I’ve read from the Sunday Times... this week ... South Africa is doing well in the taking care of the environment –recycling with the plastics... Oh! And I’ve said. Wow! So what you are doing it has something that is good for us. Although we are not in that standard of ... whereby you are owning a company or you are working for the company that is doing that thing. But the little thing that I am doing in the class, it will make something. By the time the learners are at the high school or at the university, they will realise that those lessons that I used to teach them. (11)

The same teacher indicated a sense of herself as a researcher considering how she took note of environmental concerns in the media:

They will. Also on the radio and the television ... if they are talking about the environment, you still, I am just , ... I am listening attentively: “What are they going to say now”. So I must listen attentively because I am in the [Eco-Schools] programme. And I have seen what the programme is doing for our community. (11)

The presentation of data regarding teacher as researcher is continued below with an emphasis on the reflexivity of teachers particularly in improving their classroom practice. The first discussion indicates the confidence that one of the teachers had in her ability as a teacher, while acknowledging room for more reflexivity:

Teacher: I am supposed to have evidence [in the form of lesson plans]. It is just that, as I am saying truthfully, I hadn't had time to prepare this lesson the way it was supposed to be done ... That is what we do. Especially us experienced teachers. You know [laughs]. I use my experience to bring together the knowledge that children have and the new knowledge. Because I know how to do that. That is what we do as teachers. It is just that we need to be more reflexive of what – of our practice, so that we can grow – you know? So that we can assure that whatever we do, it is all about quality education. (15a)

This same teacher argued for the role of cluster-based teacher professional development as a way of developing that reflexivity rather than simply serve as an information dissemination tool:

*Teacher: That is not going to help **me**... What am I doing if you say – turn to page ... **read**. You know what I am talking about? We are supposed to discuss these issues, engage, participate. There should be active learning within workshops ...At the same time we are supposed to network there. If I have a problem I know there is somebody who have managed to overcome this challenge. I must just go and ask – here is that problem you were talking about. Can you just help me here? It is supposed to be like that, but it is not happening. Yet, the government will say: "All the teachers are developed". All ...you know?*

Ingrid: Because they have read the document?

Teacher: Yes! Yes! Or they have been workshopped. That is why the other guy, when they were here, said the teachers need to be developed. I said to him: "This is not working. The government has been doing all this teacher development. What is needed now is teachers voices about the environment they are in. About the things that they are doing in

the classroom. About the challenges they are facing in the classroom. And the way forward. (I5a)

This same teacher stated that she does not often have time to plan her lessons as she would like. This relates to the assumption in the Schools and Sustainability Course that the course is supporting teachers to prepare lesson plans that they would be preparing anyway (see Section 6.3.2.1):

I think if I can prepare regularly – it will give me enough time to reflect – manage my time so that I can learn my lesson. Because that’s what – there’s many things – as much as I love to teach, most of the time I don’t write, I don’t plan, I don’t have time to plan what I am going to teach. I rely on my knowledge. Sometimes I forget what is it that I planned to teach and using a timetable could benefit me. (I5a)

Considering the teacher’s acknowledgement that she does not do much lesson planning, the contradictory quote below indicates that teachers may be simply producing lesson plans as a Department of Education requirement:

Ingrid: What is your experience in the classrooms? With ... how the teachers run their lessons? Do they usually work from a structure? An informal structure? Do they work from a lesson plan? Do they work from a textbook?

Nomsa: They work from lesson plans.

Ingrid: And do you see them referring to the learning programmes?

Nomsa: They follow the learning programmes – eh. (Tut11)

Indications of teachers having the appropriate skills to support a disposition towards addressing food security issues in their community are presented below. Evidence is provided of how two teachers integrated environmental action into their personal lives – beyond the boundaries of school commitments. This illustrated how well-positioned they were with their gardening experience to take on a pastoral role invoking growing vegetables to complement the school feeding scheme. A discussion with the first teacher proceeded as follows:

Teacher: We do have a community garden around there. The garden which I am working with.

Tutor 1: It is a separate garden?

Teacher: Yes, although in our school we have given them a piece of land where they can use – because they are helping us in this garden ... Members were inspired by this garden and they started their own garden in the community on this side.

Tutor 1: So you must spend your whole life advising and gardening? It is so big!

Teacher: I do like gardening. And I have my own garden at home.

Tutor 2: When I phone her, she says she was working outside in the garden.

Teacher: It is big.

Tutor 1: Fantastic. Brilliant.

Teacher: Around my area some of them they are starting their own gardens. It is just that I don't have time. I thought if I have time ... I will go around and inspire them to grow their own vegetables. (I5a)

The second teacher commented on her involvement in a gardening project at school:

It is very much important in my life. It doesn't end here. Because in my village there are three garden projects now. I motivated them in the church. Saying there is something we do – they should also do it in their area. Also at my home. There still I have got a garden. I don't buy. I don't buy. I have gained a skill. And I always share with other people about all that. Finally this year my son has bought a plot at R15 000 where we are going to start farming. (I4)

6.5 CONCLUSION

This chapter described the three Learning Units of the Schools and Sustainability Course which covered broadly: environment in context, environment in the curriculum, environmental information and resources, enquiry and action activities, assessment, and planning for environmental learning.

The data that followed illustrated the influence of the Learning for Sustainability Course, the NEEP-GET, and Eco-Schools on the Schools and Sustainability Course with reference to evaluations and reports from these projects. This review also drew on documents from the Makana NEEP-GET cluster (the prototype Schools and Sustainability Course) and six cohorts of the evolving Schools and Sustainability Course. The discussion included consideration of three significant features in the development of the Schools and Sustainability Course that have significance for an interest in transformative praxis, namely the influence of individualistic assessment and accreditation, the influence of learning and teaching materials and other resources in contextualising processes, and the influence of organising frameworks in defining planning, roles and responsibilities in schools.

The chapter also reflected on teacher professional development considerations: namely a cluster-based approach to teacher professional development framed within a spiral model which added implementation-based, research-based and reflexive dimensions to Department of Education teacher cluster structures. This was followed by the presentation of data illustrating relations between the Schools and Sustainability Course and national teacher professional development requirements expressed in the Integrated Quality Management System and Norms and Standards for Educators.

The review of the Schools and Sustainability Course's engagement with active learning processes included discussion on the influence of school environmental policies, general audits (reviews) and picture narratives in guiding the choice of active learning foci; the role of resource packs as learning and teaching support materials to develop foundational knowledge around chosen environmental foci;

the role of theme-specific enquiries in situated learning practices; the importance of meaningful learning and realistic problem-solving to support transformative practice; the role of prior knowledge, indigenous knowledge, communities and partners in developing foundational knowledge; the challenge of language in the use of learning and teaching support materials; and the role of critical thinking in environmental deliberations.

The final section reported Schools and Sustainability Course interactions and deliberations. Firstly curriculum deliberations were discussed including considerations of an holistic, environmental justice focus for environmental learning; the application of this focus in the different learning areas of the Revised National Curriculum Statement; the challenge of applying environmental content in skills-focused learning areas such as language and Arts and Culture; and the need for maintaining a consistent response to curriculum purpose within all levels of curriculum design. Secondly, important knowledge foci such as links between consumption and waste and human and environmental health were discussed; as well as the challenges associated with working with them such as how to access appropriate information. Thirdly, teaching and learning methods were deliberated, particularly developing in-depth and scientific enquiries and methods for reporting. Fourthly, learning and teaching support materials were discussed in terms of availability and teachers' ability to find and access their own resources, their value to teachers, and teachers' ability to develop and adapt their own resources. Fifthly, this section reported debates on the course about assessment purpose, practicalities around assessment, and assessment tools. Next, the section discussed the complexity of linking whole school development to curriculum work; followed by the complexities of school-community, internal school, cross-school peer, and teacher-tutor/partner relationships that are also central to whole school processes. Finally the chapter finished with a discussion on how teachers' identities were played out through various course interactions, especially their pastoral role in the community, their active environmental projects in their own lives, and their vision of themselves as active researchers and reflexive practitioners.

This chapter covered the structure, a review of influential initiatives, and deliberations and interactions on the Schools and Sustainability Course thus addressing the first goal of the research which was to: "Describe the key influential initiatives, orientation, interactions and deliberations of the Schools and Sustainability Course" (Section 1.8). This is important for understanding the policies, strategies, assumptions and intentions which structured and generated the active learning processes emerging within the six different school contexts constituting the cases nested (Section 5.3) within the 2008 Border-Kei Schools and Sustainability Course. The interest in these structures and mechanisms is in line with the critical realist interest of this study as outlined in Chapter 5 and Bhaskar's contention that transcendental realism "regards the objects of knowledge as the structures and mechanisms that generate phenomena"(1978: 25 – Section 5.2). The chapter pointed to the relevance

of the data to transformative praxis because of the research interest in ***how emergent active learning processes manifest as transformative praxis in the context of teacher professional development*** (Section 1.8).

The following chapter presents the rest of the data generated during the study which reports the specific contexts of the six nested case studies as well as the lesson plans they developed and how they played out in the classroom.

CHAPTER 7: TEACHER CONTEXT AND EMERGENT ACTIVE LEARNING PROCESSES IN THE SCHOOLS

7.1 INTRODUCTION

This chapter presents data which describes the lessons implemented by teachers of the 2008 Schools and Sustainability Course as well as the specific context in which those lesson plans were presented. This draws on data generated during observations (Section 5.6.6), interviews (Section 5.6.7) and teacher portfolios (Section 5.6.4). After a description of the lesson implementation by each teacher, the emergent active learning processes are then narrated from the vantage point of situated learning, action orientation, and deliberation and co-engagement amongst teachers and learners. This narration partly addresses the first question of the study: *How do emergent active learning processes manifest as transformative praxis in the context of teacher professional development?* through the second goal which is to: “Describe the context, planning and implementation of active learning processes in terms of their espoused and/or actualised situated, action-oriented, and deliberative and co-engaged nature”.

7.2 COMMUNITY, TEACHER AND CLASSROOM CONTEXT AND COURSE-RELATED ACTIVE LEARNING PROCESSES

The context and practice of the six teachers are discussed below – each in four sections:

- 1) The first section describes educational and environmental movement positions and practices (Bhaskar, 1998b: 51 – Section 4.2.2) informed by the Node 2 descriptive analysis (Section 5.7.1). This section describes educational and environmental movement positions (enrolment in environmental/educational programmes brought to the school by other government departments such as the Department of Agriculture’s 4H programme and non-government organisations such as WESSA’s Eco-School programme) and practices (such as waste management and gardening practices). These positions and practices are presented together with a description of the social-ecological context of the school and community thus illustrating the “‘point of contact’ between human agency and social [-ecological] structures” (ibid.). This section is significant for understanding the context, positions and practices which influenced the emergence of active learning processes as teachers worked with the ideas and challenges presented to them through the Schools and Sustainability course.
- 2) The second section is a description of teacher and classroom context (based also on the Node 2 analysis – Section 5.7.1). This section is illustrative of the educational and environmental movement positions (teachers’ roles in relation to the Norms and Standards for Educators and identities in relation to environment and sustainability) and practices (such as preferred teaching

methods and sustainability practices in the classroom) in the context of the social-ecological realities of community, school and classroom described above. This section provides further descriptions of context, positions and practices which influenced the emergence of active learning processes as teachers worked with the ideas and challenges presented to them through the Schools and Sustainability course.

- 3) Across the three learning units of the Schools and Sustainability Course, teachers developed and implemented either two or three lesson plans after completing a number of preparatory activities (as the focus for Learning Unit 3 was on assessment, some teachers added assessment tasks to a previous lesson plan and others presented a third lesson plan with assessment activities). The third section is a description of these lesson plans including the most relevant curriculum requirements selected by teachers, and an annotated description of the activities. The curriculum requirements selected by teachers are described from the lesson plans as presented in teacher portfolios. They are further elaborated by an analysis of the knowledge, skills and values evident in these. That is, either explicit, implicit or null (significantly absent) as explained in Section 5.7.1. The description is based on evidence from interviews, observations and lesson plans from the three learning units in the teachers' portfolios (that is the portfolio **lesson plans** as described in Section 5.6.4 (b)). This section makes extensive reference to a series of coloured plates in which photographs and scanned images of learning and teaching support materials, assessment rubrics and learners' work are presented. Plates are presented at the end of each teacher's case presentation.
- 4) The fourth section provides a description of the emergent active learning processes across lesson plans. It refers to the lesson plans in the previous section as well as draws on additional data from interviews, observations and portfolio activities (distinguished from lesson plans in Section 5.6.4 (a)). This section is structured by key features of active learning as outlined in Chapter 2, namely situated learning, action-orientation, and deliberation and co-engagement. Situated learning is described with respect to situating everyday and indigenous knowledge in relation to abstract school knowledge (Taylor, 1999 – Section 3.4). The situated learning sections also include situating learning in relation to learners' own lives and everyday realities (Sections 3.3.1 and 3.3.2). The latter aspect of situated learning includes both introductory explorations of learners' needs and experiences in relation to the topic at hand as well as more rigorous and systematic local enquiries conducted by learners that highlighted community needs and possibility. These local enquiries include both scientific and social science modes of enquiry and are of relevance to transformative praxis in that such enquiries can situate ensuing action in relation to generative mechanisms, contingencies (Archer, 1998a – Section 5.2) and an 'assumed set of resources' (Bhaskar, 1993 – Section 2.6.3; Frank, 2010 – Section 3.4). The action orientation section highlights the successes and difficulties experienced with practical environmental improvement projects teachers instigated with learners in the classroom, school and community. The final section in the description of the active learning process – deliberation and co-engagement –

elaborates on scientific, social and value-based knowledge that learners worked with, and additional reflection on how these ‘knowledges’ were employed in critical, deliberative and co-engaged learning processes.

A difficulty with writing up the lesson plans in the second section was that teachers had moved activities around a lot in their files in order to respond to assessment criteria for each learning unit. In order to present the teachers’ work in a logical manner I sometimes found it necessary to report some activities in a different order or under different lesson plans to the way in which they were represented in the portfolio Learning Units (this was kept to an essential minimum). This means that there may be a case, for example, where discussion on Lesson Plan 1 (LP1) refers to data from a portfolio Learning Unit 3 (Port - LU3). Sometimes activities reported in reflections in the portfolio were not listed in the lesson plans. However, there was still convincing enough evidence that these activities had been done and these activities are reported in the ‘active learning’ third section as described above. This inconsistency is explained by one of the teacher’s comments about working spontaneously and not always having time to list her work in her portfolio (see Section 6.4.8).

7.2.1 Teacher 1: Nokhanyo

The data used to construct this section comes from Nokhanyo’s school and community profile (SCP1), teacher and classroom profile (TCP1), the two observations conducted during school visits (ONV1 and ONV2), the interview with the teacher (I1), the portfolio activities (PortNVLU1, LU2 and LU3), and the portfolio lesson plans (LP1NV, LP2NV and LP3NV). The sections that follow draw on this data to present a school and community profile, teacher and classroom profile, a description of activities and curriculum requirements selected for three lesson plans, and a description of the emergent active learning processes across all three lesson plans including links to school and community action projects.

7.2.1.1 School and community context

This section describes the case of Nokhanyo – a Grade 3 teacher at a lower primary school (School 1 – Figure 1.2), in a peri-urban outlying ‘township’ of King Williams Town. She explained the lack of social cohesion in her community thus:

The people who are staying here ... the other one will come from Durban, come from Cathcart. We come from Peddie ...with social problems ... Then they come together. They don’t even know each other. You see ... I’m from a rural area as well, but in my location I know my neighbour. I know most of the people in the community because we are the bona fides of that area. (I1)

Nokhanyo described the community surrounding her school as one facing unemployment, poverty, illiteracy, and high population, with associated problems of crime and drugs. Despite these challenges, Nokhanyo reported a good relationship with the school governing body who provided resources and contributed to educational activities. She also reported a good relationship with the community who responded well to the introduction of environmental education (SCP1). However she described a problem with the ability of the community to respond to serious problems such as rape and crime: “And the community is just kept quiet. It’s not like other communities. Because in some communities, if they encounter these problems, they come into a meeting” (I1).

The school struggled to manage waste which was put in a pit and burnt, but blown around by the wind in between burning. This was consistent with a community wide problem of waste dumping (SCP1, I1). The school was not fenced on three sides which exacerbated the waste management problem and added to the problem of lack of security for learners (I1), and resulted in animals scratching cars and eating litter (I1). The ablution facilities consisted of six toilets for 600 learners. An extra one was built for the 22 teachers but this was in a state of serious disrepair (ONV1:1).

Nokhanyo explained that her school was an Eco-School and listed tours to the museum and aquarium as environmental activities they were involved in. In mid-2008 the school had established an Eco-School committee and parents had shown a big interest in environmental education (DW1), however the school registered in both 2008 and 2009 and did not submit portfolios. In 2010 and 2011 the school did not register for Eco-Schools. The school drew on organisations such as the Department of Water Affairs and Forestry and the police crime prevention unit for additional educational interventions in the school (SCP1).

7.2.1.2 Teacher and classroom context

Nokhanyo was a participant of the 2008 Border-Kei (in the Eastern Cape) contingent of the Schools and Sustainability Course. She taught Grade 3 learners whose first language was Xhosa. She studied at Whittlesea College of Education and has a three-year Junior Primary Teaching Diploma (I1: 9) as well as a Further Diploma in Education. At the time of the study she was studying towards a Bachelor of Education in Law and Management (TCP1). She believed that: “to be a good teacher, I think first of all, you must learn. You must do your planning. You must be someone who can read. You must be someone who is so inquisitive about what is happening in the entire world. Not only with your environment” (I1). Indicating a sense of her pastoral role in her community she explained: “I’m a mother. I’m a member of a church. I am a member of the community. I think this can also help me to uplift the standard of living for the others” (I1). Nokhanyo believed in trying out ideas despite insecurity about how they might turn out. For example, she explained how her colleagues were

thinking about whether to plant the fruit trees [donated by WESSA] in the garden of a community member, whilst being unsure how it would work with the learners wanting access to the fruit. Nokhanyo pointed out “you can’t always be afraid of what you don’t know” (ONV2).

Nokhanyo’s primary teaching methods listed at the start of the course were learners copying work from the board and doing practical activities in the classroom. Second most common were fieldwork and classroom experiments. The least common were lectures, learners researching information and learners doing research in the community (TCP1). Nokhanyo’s lessons were conducted in Xhosa and flashcards and learners’ writing were in Xhosa, although worksheets from an English textbook were used untranslated. Nokhanyo drew on a large variety of learning and teaching support materials for her teaching including textbooks, government flyers and the RNCS, activity packs and newspapers.

Nokhanyo shared her classroom with another teacher due to classroom shortages so that 80 learners were in one classroom at a time (I1) (see PLATE 1, Photograph 1). She cited overcrowding and lack of furniture as two particular concerns that hindered her teaching (TCP1). Another problem with teaching was hunger in the classroom. For example, Nokhanyo related the story of a child who, with his older brother, was only managing to feed themselves one meal of pumpkin each day (I1). Because of widespread poverty in the community learners received bread and butter through a school feeding scheme. They sometimes received a health drink but this came inconsistently (OBN1).

7.2.1.3 Teaching and learning activities

In this section, the details of the three lesson plans are briefly outlined (based on evidence from the teacher’s portfolio). The lesson plans focused on waste and recycling, composting and recycling, and paper-making and recycling respectively. Each lesson plan description includes a table outlining curriculum requirements selected by teachers (the main and integrated learning areas³⁷, with the chosen learning outcomes and assessment standards with associated knowledge, skills and values) followed by a brief description of each activity.

Lesson Plan 1

Tasked through the first course assignment to design a lesson plan to help learners to find, use and present environmental information (Table 6.1), Nokhanyo focused on recycling and environmental health. The curriculum requirements selected by Nokhanyo for the first lesson plan (including learning area, learning outcomes and assessment standards) are outlined in Table 7.1 below.

³⁷ See Section 6.2 for explanation of how lesson plans are structured using a main learning area which is formally assessed and one or more integrated learning areas which deepen the knowledge and skills of the main learning area, but which are not assessed.

Table 7.1 Curriculum requirements selected for Nokhanyo’s first lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 2 (Grade 3): Participates in a recycling project, and explains how recycling contributes to environmental health	³⁸Knowledge (Explicit): Link between recycling and environmental health. (Implicit): How waste contributes to environmental degradation (soil, air and water pollution, and biodiversity loss) at all levels of life cycle of waste products; and how these impact on the health of living organisms Skills (Explicit): Informed decisions, recycling. (Null): Systemic complexities of setting up a recycling system Values (Implicit): Concern for personal, community and environmental health (Null): Assumption that recycling is good
Integrated Learning Area: Economic and Management Sciences	
LEARNING OUTCOME 1: THE ECONOMIC CYCLE The learner will be able to demonstrate knowledge and understanding of the economic cycle within the context of ‘the economic problem’ ASSESSMENT STANDARD 1 (Grade 3): Describes ways in which the household or school can generate an income from waste materials (e.g. paper, glass, tin), or save money by recycling	Knowledge (Explicit): The curriculum elaborates on these two features of the learning area: The economic cycle: “The flow of money, goods and services between households, business, government and the foreign sector” (Implicit): If you know that income can be generated from waste through re-use or recycling, then re-use and recycling are implied here (Null): The possibility of reduced consumption is not explicit or implicit in this case Skills (Null): The curriculum does not suggest trying out re-use or recycling but the possibility is there Values (Implicit): The economic problem: considering “unlimited needs and wants in the face of limited resources” and considering South Africa’s “legacy of inequity and consequences for the economy and South African citizens” (South Africa. Department of Education, 2002c: 4). They add that “a ‘balanced’ economy means one which aims to achieve sustainable growth, reduce poverty and distribute wealth fairly, while still pursuing the principles of an open market and profitability. It promotes respect for the environment, human rights and responsibilities” (South Africa. Department of Education, 2002c: 5). The learning area also questions consumerism while respecting basic human needs and need for equality; and at the same time respecting resource limits. Although, not directly linked to this learning outcome, the learning area features also draw attention to the importance of “reconstruction, sustainable growth and development”. (Null): tensions within the notion of ‘sustainable growth’ where open market and profitability may inhibit human rights and environmental health

³⁸The explicit, implicit and null knowledge, skills and values in this part of this table and those that follow is a result of the first abductive curriculum analysis described in Section 5.7.1.

Integrated Learning Area: Social Sciences (Geography)	
LEARNING OUTCOME 3: EXPLORING ISSUES: The learner will be able to make informed decisions about social and environmental issues and problems ASSESSMENT STANDARD 1 (Grade 3): Identifies one or more pollution issues in a particular context (e.g. wasting water, energy or physical resources; safe disposal of refuse or chemicals) [the issues]; ASSESSMENT STANDARD 3 (Grade 3) identifies the impact of the pollution on the local environment	Knowledge (Explicit): List of some ‘issues’ (Implicit): Generic information about what makes the listed types of pollution ‘issues’ Skills (Explicit): Informed decisions (Implicit): In the introductory chapter the curriculum suggests an enquiry process that involves identifying, understanding and making choices regarding an issue (South Africa. Department of Education, 2002h: 49) and that learners “use a range of methods in the accurate presentation of information – in graphic and tabular format, and by using a variety of maps, photographs and images” (ibid.: 70) Values (Explicit): Pollution is a problem (Implicit): The curriculum states that Geography should foster “an informed concern for the world around us and an ability and willingness to participate in actions for a sustainable environment” ((South Africa. Department of Education, 2002h: 5)

The activities conducted to actualise these curriculum expectations are briefly described below:

- Activity 1: Learners discussed what they did not like at school and the teacher gave learners information on definitions: Waste, littering and recycling.
- Activity 2: Assessment task: Learners visited two dumpsites (at school and an informal one) and filled in a comparative worksheet (see PLATE 1, Photograph 2).
- Activity 3: Assessment task: Learners did a worksheet on land pollution (take home exercise) (see PLATE 1, Photograph 3).
- Activity 4: Assessment task: Learners learned a rhyme about the impacts of dumping of waste on our health and environment (see PLATE 1, Photograph 4).
- Activity 5: Teacher discussed the concept of recycling with the learners. Learners did a puzzle to find words related to recycling.
- Activity 6: Assessment task: Learners filled in worksheet on what they use paper and cardboard for at home and school (see PLATE 2, Photograph 5).
- Activity 7: Learners collected paper for recycling. Learners made fireballs³⁹ and advertised these. They conducted a discussion on how, where and to whom they should be sold. Learners made a poster to advertise the product⁴⁰.

³⁹Fireballs are compact balls of paper made from a course paper mache and used as an alternative fuel source.

⁴⁰ There was no evidence that the advertising proposed in this activity had been successfully implemented.

These activities reflect the Social Sciences interest in identifying the nature and impact of pollution issues in context, the Life Orientation interest in understanding the link between environmental concerns and human health, the Life Orientation interest in doing something about the problem (through recycling) and the Economic and Management Science interest in an economic rationale for recycling. As required by the assessment task for Learning Unit 1 (Table 6.1), the information element of the active learning framework was addressed in this lesson, with exploration of the nature of waste (through looking at definitions) and the impact of waste on health (through the rhyme). In response to the Schools and Sustainability Course Learning Unit 1 emphasis on how to find, use and adapt information (Section 6.2), Nokhanyo wrote her own rhyme in Xhosa about the effects of waste on health. Illustrating the Learning Unit 2 support for teachers to find and develop qualitative and quantitative enquiry tools (Section 6.2), Nokhanyo drew on two qualitative worksheets copied from a textbook which respectively supported learners to conduct a dump site visit and explore waste issues on their route between school and home. The lesson also started to explore action-options such as making of fireballs.

Lesson Plan 2

For Learning Unit 2 teachers were tasked to develop a lesson plan focusing on enquiry and action (as taught in Learning Unit 2), but also bringing forward a focus on working with information from Learning Unit 1 (Table 6.1). Nokhanyo developed activities linked to three learning areas and assessment standards focusing on composting as a way of improving the soil. The learning outcomes and assessment standards are outlined in Table 7.2 below:

Table 7.2 Curriculum requirements selected for Nokhanyo's second lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 3: PERSONAL DEVELOPMENT: The learner will be able to use acquired life skills to achieve and extend personal potential to respond effectively to challenges in his or her world ASSESSMENT STANDARD 5 (Grade 3): Identifies group work skills and applies them consistently	Knowledge (Implicit): Knowledge focus dictated by the group work task Skills (Explicit): Applying group work skills (Implicit): Skills such as listening, taking turns, and role clarification Values (Implicit): Valuing learner participation in democratic society

Integrated Learning Area: Economic and Management Sciences	
LEARNING OUTCOME 1: THE ECONOMIC CYCLE: The learner will be able to demonstrate knowledge and understanding of the economic cycle within the context of ‘the economic problem’ ASSESSMENT STANDARD 2 (Grade 3): Discusses alternative goods and services as a way to economise and save	Knowledge (Implicit): See Table 7.2 for elaboration on economic cycles and economic problem. The curriculum introductory chapter suggests that “other innovations can also be explored. These involve the development of small, medium and micro enterprises in production” (South Africa. Department of Education, 2002c: 9). (Null): No suggestions made for specific alternative goods and services. In this case making own compost was proposed (implicitly) as an alternative to fertiliser Skills (Null): The curriculum does not suggest trying out or making alternative goods and services, but the possibility is there Values (Explicit): Financial reward from alternative practices. (Null): Valuing alternative services from an ecological perspective

Integrated Learning Area: Arts and Culture	
LEARNING OUTCOME 3: PARTICIPATING AND COLLABORATING: The learner will be able to demonstrate personal and interpersonal skills through individual and group participation in Arts and Culture activities ASSESSMENT STANDARD 3 (Grade 3): Identifies and plans collective artwork which shows problem solving, negotiation of conflict and enjoyment	Knowledge (Implicit): Knowledge focus dictated by the context of the artwork. In this case the knowledge was ‘how to make compost’ Skills (Explicit): Personal problem-solving, negotiation of conflict Values (Explicit): Enjoyment of art (Null): The stated skills were directed at working as a collective. But, neither this learning outcome, nor the broader learning area explores the role of art in developing a critical voice with respect to environment (although it does state the need to “identify the links between cultural practice, power and cultural dominance” (South Africa. Department of Education, 2002b: 4)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Teacher gave an introduction to compost.
- Activity 2: Teacher gave information about value of cow dung, ash and other composting material. She supported this by showing and labeling different ingredients with flash cards (PLATE 2, Photograph 6).
- Activity 3 Assessment task: Learners drew compost components (PLATE 2, Photograph 7).
- Activity 4 Assessment task: Learners did an enquiry at home about composting. Learners then gave feedback on their investigation in groups. The groups did a report which was captured on the blackboard by the teacher and written up by learners (PLATE 2, Photograph 8).

- Activity 5: Individuals learners wrote a paragraph about ‘the importance of compost for plants’ (PLATE 3, Photograph 9).

These activities responded to the Life Orientation interest in group work (the learners presented findings in groups), the Economic and Management Sciences interest in the economic rationale of ‘alternative goods’ (through demonstrating the possibility for compost-making as opposed to buying compost) and the Arts and Culture interest in artwork for problem-solving (through drawing pictures of how to make compost). Activity 4 responded to the course assessment task which required the teacher to develop a qualitative or quantitative ‘enquiry’ (although none of the learning outcomes or assessment standards explicitly required the development of enquiry skills). Nokhanyo developed her own enquiry tool which consisted of a series of questions given to learners focusing on the components of compost, the composting process (how and when it is made in the community) and the link between composting and healthy plants. In addition the assessment task requirement for working with information was also addressed through flash cards to develop learners’ vocabulary and a poster about how to build a compost heap. Although this was Nokhanyo’s intention (I1), the actual making of the compost (in relation to action requirement of Learning Unit 2 assessment) was not completed.

Lesson plan 3

In Learning Unit 3 teachers were tasked to present a lesson plan (either drawing on activities from the previous Learning Units or developing new activities) and to design assessment tools for the lesson activities. Nokhanyo presented a mixture of old and new activities in her third lesson plan (deepening some of the activities from Learning Unit 1 and 2). Her lesson plan re-addressed the recycling assessment standard of Lesson Plan 1. This was integrated with different learning areas, namely Technology and Home Language.

Table 7.3 Curriculum requirements selected for Nokhanyo’s third lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 2 (Grade 3): Participates in a recycling project, and explains how recycling contributes to environmental health	Knowledge (Explicit): Link between recycling and environmental health. (Implicit): How waste contributes to environmental degradation (soil, air and water pollution, and biodiversity loss) at all levels of life cycle of waste products; and how these impact on the health of living organisms Skills (Explicit): Informed decisions, recycling. (Null): The systemic complexities of setting up a recycling system Values (Implicit): Concern for personal, community and environmental health (Null): Assumption that recycling is good

Integrated Learning Area: Technology	
LEARNING OUTCOME 1: TECHNOLOGICAL PROCESSES AND SKILLS: The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies ASSESSMENT STANDARD 3 (Grade 3): Expresses how products are going to be made and what will be used to make them; makes products safely by joining or combining range of different materials	Knowledge (Implicit): Knowledge of production process (Null): Knowledge of ways that technology can impact on the environment (in this case, industrial paper-making) Skills (Explicit): Makes a product Values (Explicit): Valuing ethical and responsible practice (Implicit): The purpose of Technology is stated as (when developing products) the need to “learn to minimize the potential negative impacts that their solutions could have on the environment and on human rights” (South Africa. Department of Education, 2002i: 4)

Integrated Learning Area: Home Language	
LEARNING OUTCOME 4: WRITING: The learner will be able to write different kinds of factual and imaginative texts for a wide range of purposes ASSESSMENT STANDARD 8 (Grade 3): Writes legibly (with ease, speed and in given time frame)	Knowledge (Implicit): Knowledge focus influenced by the main learning area (in this case, recycling) Skills (Explicit): Writes facts and imaginative texts; writes with ease, speed and in given time frame Values (Implicit): Valuing factual and ‘visioning’ thought processes

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Teacher displayed products made from waste. Class discussed recycled products and what they are made of. Teacher supported this with flash cards to show how words are written (PLATE 3, Photograph 10). Teacher asked learners what they knew about keeping the environment clean.
- Activity 2: Informal assessment task: Learners looked at the waste outside the school yard and discussed: “What would happen to our environment outside if waste was not managed in a proper way”? This activity was assessed using an observation schedule (PLATE 3, Photograph 11).
- Activity 3: Assessment task: Learners wrote a text (point form) to explain how recycling contributes to environmental health. Their work focused on how recycling keeps surrounding soil and water clean (PLATE 3: Photograph 12). This was assessed using a rubric (PLATE 4: Photograph 13).
- Activity 4: Assessment task: Learners participated in the recycling of paper. Teacher explained the process of recycling. For assessment learners had to order and paste pictures and add text to explain the process (PLATE 4: Photographs 14 and 15).

These activities reflect the Life Orientation interest in recycling (through making paper), the Technology interest in making products (through organising pictures regarding the process) and the Home Language interest in writing factual texts (through writing about the steps in the paper-making process – in relation to the pictures, and also through writing how recycling contributes to health). These latter two Home Language tasks met one of the requirements of Learning Unit 3 (to develop assessment tools), and ensured that knowledge of the link between recycling and environmental health was consolidated and that the paper-making skill was consolidated through organising pictures of and writing about the process. The lesson plans demonstrate the active learning dimension of working with information supported by flash cards developed by Nokhanyo about items made from waste. This illustrates a response to the Schools and Sustainability Course Learning Unit 1 encouragement for teachers to adapt and develop their own information (Section 6.2). Further to the information dimension of active learning, Nokhanyo shared information about the link between waste and environmental health in a class discussion in Activity 2. The lesson plan also demonstrates an action activity (making paper) with supporting information (pictures about how to make paper) in accordance with support, in Learning Unit 1, for teachers to find creative ways of using information (Section 6.2). In accordance with the Learning Unit 3 requirements, the lesson plan had two assessment tools. These demonstrated assessment of the information dimension of the active learning framework (PLATE 4, Photograph 13) and of the action dimension of the active learning framework (PLATE 4, Photograph 15).

NOKHANYO: PLATES 1-4

PLATE 1



Photograph 1: Classroom of 80 learners (ONV1)

WASTE SITE QUESTIONNAIRE

NAME: { } GRADE: 3

	LAND FILL SITE (FORMAL)	INFORMAL
1. What good things do you see on the site?	Nothing ✓	Tall trees, bricks ✓
2. What bad things do you see on the site?	Papers, plastics, card ✓	bad smell ✓
3. Are there any adults at the site?	yes ✓	yes ✓
4. Is it close to the houses?	no ✓	no ✓
5. Can you see flies or rats and mice?	Flies ✓	yes ✓
6. Are there birds at the site? Name them	yes unatsweyi ✓	yes unatsweyi ✓
7. Is there a fence surrounding the site?	no ✓	no ✓
8. Are people wearing gloves, protective clothing? e.g. gloves	no ✓	yes ✓

Photograph 2: Learner's work: Comparative worksheet between landfill and informal dumpsite (LP1NV)

Activity 6 Land pollution

On your way home today look around you. *2 Well done!*

Can you see any papers, plastic bags, ice-cream sticks, old tins, orange or banana peels or any other litter? *yes*

Ask your parents and other adults whether it is a good or a bad thing to have litter lying about it. *it is a bad thing*

Ask them where the litter comes from and why it is lying around. *people throw it*

Report the answers to your classmates and teacher.

Look at this picture.

Talk about all the things that cause litter. *paper, plastic, etc.*

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Photograph 3: Learner's work: Questionnaire on land pollution for homework

Activity 14 A chant

Clap your hands in time while you chant this rhyme.

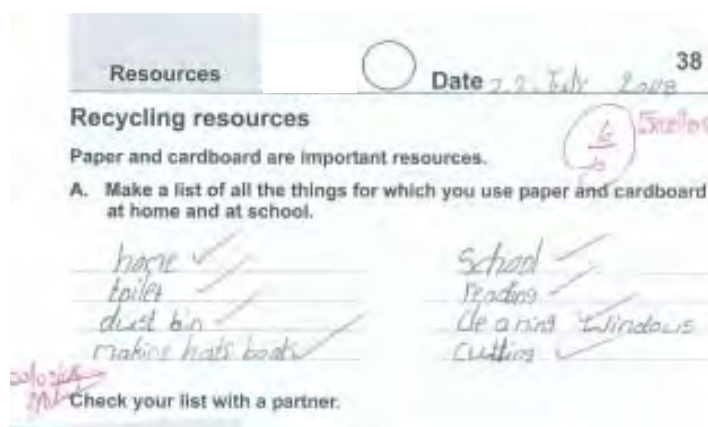
EFFECTS OF WASTE

izinkozi mako
ezilahlwazi thubehi
lithsholohane zipangela
izinkozi mako ehatshakla
isosephepha.

We must all do our best
To help the world fight this pest.

Photograph 4: Rhyme sung by learners about the effects of waste on health

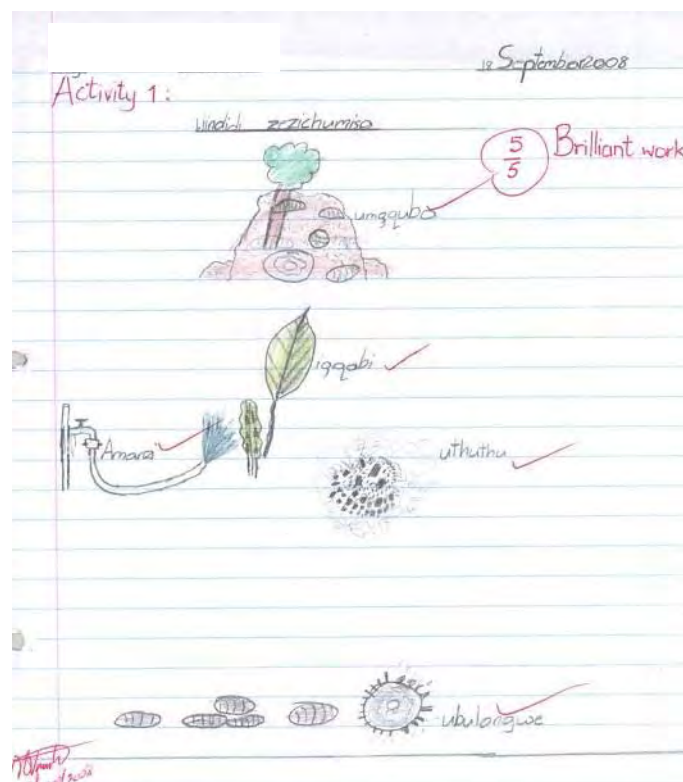
PLATE 2



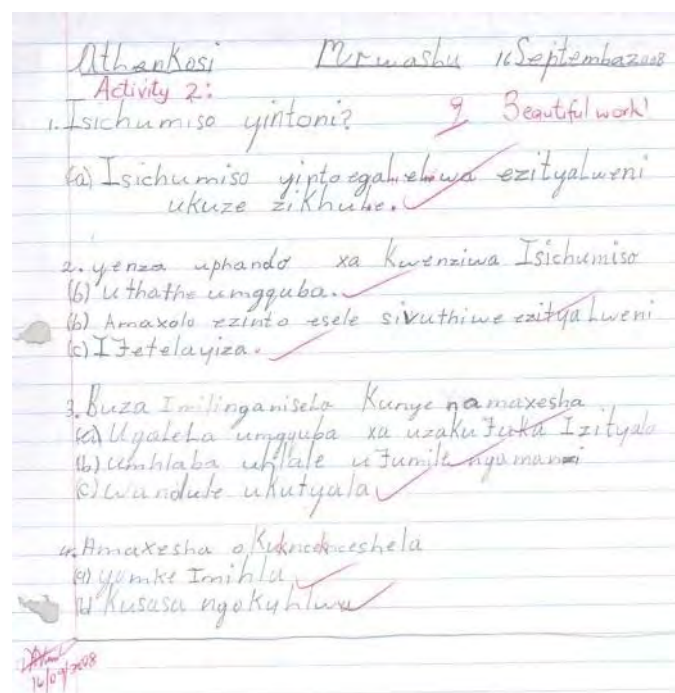
Photograph 5: Worksheet investigating the uses of paper and cardboard at home and at school



Photograph 6: Ingredients of compost labelled by teacher



Photograph 7: Learner drawing of components of compost

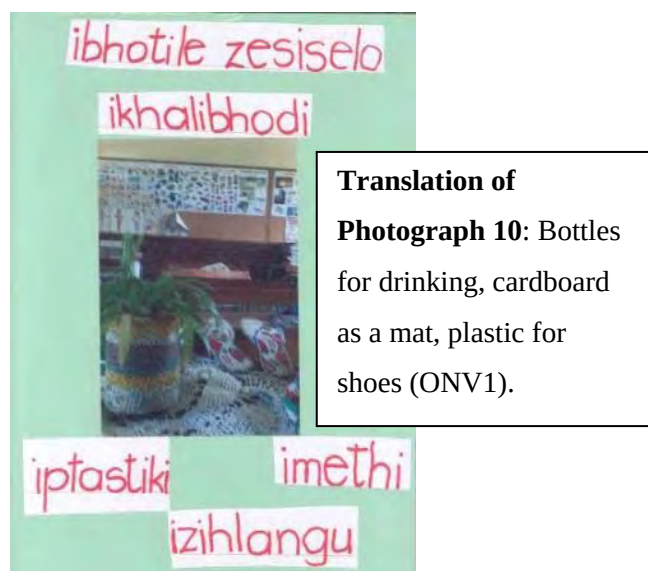


Photograph 8: Learners work copied from summary of compost investigations written on board by teacher

PLATE 3



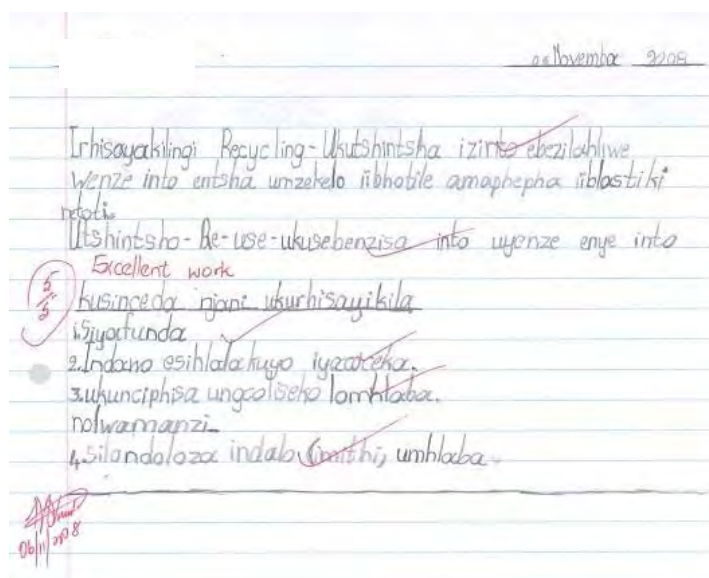
Photograph 9: Learner's work: Summary of the importance of compost



Photograph 10: Flash cards to develop vocabulary about waste

INFORMAL ASSESSMENT					Key
Grade: 3					✓ competent
ACTIVITY: Explains how recycling contributes to environmental health.					Needs Improvement
Learning Outcome 1B5: Thinking and reasoning					
Assessment standard 52: Using language to think and reason					
Teacher observation sheet					
NAME OF LEARNER	Able to speak	Able to function in the classroom	Able to think critically when assessing info	Able to solve problems	comment
Nobephela Sibusiso	✓	✓	✓	✓	Competent
Ntengu Lamlu	✓	✓	✓	✓	Competent
Nqom Sandani	✓	✓	✓	✓	Competent
Nyikana Asenile	✓	✓	✓	✓	Competent
Pelason Athekisi	✓	✓	✓	✓	Competent
Sifana Saphumile	✓	✓	✓	✓	Competent
Sijana Nangama	✓	✓	✓	✓	Competent
Spedman Naphawu	✓	✓	✓	✓	Competent
Spedman Nongelwa	✓	✓	✓	✓	Competent
Stanele Sibaso	✓	✓	✓	✓	Needs improvement
Nurani Siphokile	✓	✓	✓	✓	Competent
Thethani Sivenathi	✓	✓	✓	✓	Competent
Toni Sue	✓	✓	✓	✓	Needs improvement
Mhwashu Athekisi	✓	✓	✓	✓	Competent
Hobday Nuyile	✓	✓	✓	✓	Needs improvement
Zobetho Zille	✓	✓	✓	✓	Competent
Gouba Regina	✓	✓	✓	✓	Competent
Fem Athekisi	✓	✓	✓	✓	Competent
Nandaka Nlani	✓	✓	✓	✓	Competent
Nangana Nkomo	✓	✓	✓	✓	Competent
Moni Janyu	✓	✓	✓	✓	Competent
Nathwanga Nkomo	✓	✓	✓	✓	Needs improvement
Mfundisi Bongisi	✓	✓	✓	✓	Competent
Nangaphela Thabisi	✓	✓	✓	✓	Needs improvement

Photograph 11: Assessment of oral presentation on how recycling contributes to environmental health



Photograph 12: Learner's work explaining how recycling contributes to environmental health

PLATE 4

DATE:	06 November 2008			
LEARNING PROGRAMME:	Life Skills			
LEARNING OUTCOMES & ASSESSMENT STANDARDS:				
LO1: Health Promotion				
AS 2: Participates in a recycled project and explains how recycling contributes to environmental health				
RUBRIC	The teacher puts a tick in the box that matches learner's performance			
CRITERIA	1	2	3	4
1. The learner is able to explain how recycling contributes to our health	Unable to explain at all	Can explain a few points	Can explain some but not all	Able to explain all points
2. Can identify common waste at school and at home	not able to identify common waste	can identify a few	can identify a lot	can identify occasional
3. Writes legible	can not show understanding in writing	his/her writing has many mistakes	few mistakes	her/his writing is clear
4. Understands why it is important to manage waste	has no understanding	needs help to understand	shows understanding	shows exceptional understanding

Photograph 13: Assessment rubric of learner paragraph on how recycling contributes to environmental health



Photograph 14: Learner's work in which learner was required to arrange in order, glue in and label pictures representing the paper-making process

Grade: 3

CHECKLIST

Activity 111

L. Progr. Technology

LO Learning Outcome: 'LO1' PROCESSES AND SKILLS

As Assessment Standards: 3. Makes: Expresses how products are going to be made and what will be used to make them.

KE3: ✓ Competent ✗ Needs Improvement

Activity: 3

Name of Learner	Engage in recycling	Participate in recycling	Make to match process & standards	Can recycle a paper	Comments
Babala Zandile	✓		✓	✓	Competent
Caka Sinelo	✓		✓	✓	Competent
Cekisani Mkhosho	✓		✓	✓	Competent
Dinazi Zankhitha	✓		✓	✓	Competent
Daniso Themba	✓		✓	✓	Competent
Daniso Sinokup	✓		✓	✓	Competent
Dyasi Oscar	✓		✓	✓	Competent
Dyasi Sanele	✓		✓	✓	Competent
Feyi Siphokazi	✓		✓	✓	Competent
Goba Sinokhelo	✓		✓	✓	Competent
Hlangabeza Lelethu	✓		✓	✓	Competent
Mami Sanga	✓	✓	✓	✓	Competent
Mangalo Thembani	✓		✓	✓	Competent
Mankeni Sesehu	✓		✓	✓	Competent
Mankwaga Mabizile	✓		✓	✓	Competent
Maji Mawule	✓		✓	✓	Competent
Maji Azemahle	✗		✓	✓	Competent
Mhondozi Bongiso	✗		✓	✓	Competent
Mkhazeni Avuyile	✓		✓	✓	Competent
Mkhoshozi Bathandile	✓		✓	✓	Competent

Photograph 15: Assessment of learners' ability to make paper and explain the paper-making process

7.2.1.4 Active learning process

This description of the active learning process discusses Nokhanyo's environmental learning activities across her three lesson plans with additional data from her portfolio (PortNV-LU1 - LU3), interviews (I1) and observations (ONV1). The description is structured around three key dimensions of active learning as identified in this study, namely situated learning, action orientation, deliberation and co-engagement.

Situated learning

Section 3.4 discussed the value of inducting learners into the abstract knowledge of formal discourse through the development of a two-way relationship between everyday and school knowledge. The following data illustrates how Nokhanyo's lesson plans were influenced by a series of situated local enquiries, using fieldwork in school and formal and informal dumpsites to link waste management to abstract concepts such as litter, recycling, germs and life cycle analyses, and to link composting to the concept of 'natural' recycling.

Section 3.3.1 described the emphasis on "local enquiry, problem solving and action learning" as important pedagogical processes in South Africa (O'Donoghue, 2007: 150) and suggested that relating environmental concerns to learners' own lives was needed to help them to deal with the everyday reality of environmental risks and concerns. In Nokhanyo's case, learners explored their own context, by drawing waste in the school grounds as an environmental issue of particular concern to them. They selected the issue to draw by using a 'picture-scope' made out of a rolled up piece of paper (PortNV-LU1) and later, focused on identifying different types of waste in the school grounds (ONV1). Nokhanyo complemented this by asking leading questions about how people manage waste (ONV1). She and the learners identified burning of waste as another issue of concern in the school (I1). Reflecting on the enquiry where learners compared two dumpsites, she commented: "I have also learned that information gathered by learners can strengthen and extend learning" (PortNV-LU1). She added: "I thought, when you [were] talking about the enquiry [in the course], you cannot [expect] the Grade 3 learners to enquire. Eh, especially since they are so young, but they've done it. Yes, they've done it!" (I1).

In another situating activity, Nokhanyo asked learners to investigate how compost was made in their community. This was to introduce compost-making practices as a way of recycling organic material. Learners were able to relate to the compost-making activity as an alternative to buying compost in the shops as is evidenced in Nokhanyo's reflection on the activity where she comments on learners' reaction to the activity: "They were **so** interested. The learners said

“Oh ... so that compost that is at Shoprite, we can make it also”. Yes ... you can! So I love it” (I1). Learners were able to link composting to the abstract notion of nutrient recycling.

Action orientation

During Learning Unit 2, teachers on the Schools and Sustainability Course were encouraged to link their lesson planning to environmental projects in their schools by designing activities they could do in response to the issues they had identified through their hands-on enquiry (Section 6.2). There was evidence of such an action orientation within Nokhanyo’s practice. Based on the waste concerns highlighted in the formal and informal waste dump visits, Nokhanyo focused her Schools and Sustainability lessons on recycling and reuse as a way of reducing the amount in these sites. She did this through making fireballs from waste paper, making recycled paper, and making items from waste⁴¹ (LP1NV, LP3NV and ONV1). She also had the intention of making compost with learners (LP2NV). These different action activities are discussed below.

The intention was for learners to advertise and sell the fireballs they had made as an Economic and Management Sciences activity (PortNV-LU1). It does not seem, however that the advertising activity was completed (LP1NV). However, the potential for a small action-oriented, curriculum-linked activity was identified through Nokhanyo’s lesson plan. Another one of the intended action projects – compost-making – was also not enacted. During an observation visit Nokhanyo indicated an intention to make a compost heap for her second lesson plan (ONV2); however, by the end of the year, she had not completed this activity (LP2NV).

The recycled paper made from waste paper was not that successful. Nokhanyo realised that she needed a proper paper-making frame for the next time she did the activity (PortNV - LU3). Nomsa (the course tutor) reflected on the paper in Nokhanyo’s portfolio saying:

Maybe for a start it is good that they have seen that they can make paper and then they must make paper that is useful so that they can say – ‘we have done a card – we have done this’... She writes something that they could sell them for profit, but there must be something [better] – not just pieces of paper like that ... no ... (Tut11)

⁴¹This re-use activity was not included in the lesson plans presented but was a significant part of a lesson I observed, so it has been included here. In this activity learners collected waste from outside and, in groups, made an item of their choice from the waste.

A problem with implementing the recycling actions was identified on a field visit in 2009. During this visit Nokhanyo still had a box of paper collected during their waste management activities from 2008. She commented:

This is from the last year work, so we keep it. Not to burn it. Because we have done the recycling so even the new ones ... I want to tell them that if you've got the waste, there is something that you can do out of waste. You don't just throw the waste away because once you throw it away, it will cause the harm to your health, to the environment, to the animals, to everyone in your community and the school. (I1)

Nokhanyo commented on her re-use activity with learners (ONV1):

Also from that waste they have learned that 'Oh, from this waste we can also make something that can be useful to us, even if it is not going to be used by the older people', because learners are so creative, they will take the empty tins and make the wheels and take the wire and make something. But they are unaware that they are minimising the waste. (I1)

With respect to health concerns associated with burning of waste, Nokhanyo expressed frustration that the community was still burning their waste and “needed education” about the issue (PortNV-LU3: 41). In the school, she was also experiencing trouble with finding an alternative to burning. This is reflected in the following interview conducted in 2009:

Ingrid: You are still burning waste at school?

Nokhanyo: (big sigh) Some teachers. Yes, and I am feeling so hurt when I see burning the waste.

Ingrid: What is the alternative? Besides, there is only so much recycled paper you can make. What would be the alternative in your school?

Nokhanyo: As a school, we must have those big recycling bins ... But unfortunately our school is not fenced. Yes, because if our school has been fenced, I think I should have made some provision to go to the municipality and ask for them, if they can provide us with these recycling tins, so that whenever we've got too much waste we collect it and put it in those bins. (I1)

Deliberation and co-engagement

Integral to the enquiry and action activities described above were a series of social, scientific and value-based engagements with the environment and sustainability concepts raised during the activities. These reflected various processes of deliberation and co-engagement that are important within active learning processes.

The following categorises the foundational social and scientific knowledge signified by the topics Nokhanyo introduced to her learners over the three lesson plans as well as an explanation of the methods she used with each new topic or concept. This knowledge is

grouped in three categories: a) Definitions and concepts, b) Nature and causes of issues, and c) Problem-solving or 'how to' knowledge.

a) Definitions and concepts regarding the issue of waste and sustainable alternatives

- Definition of litter and waste: Nokhanyo told learners that “Litter is waste that has been misplaced; waste is rubbish, vegetable skin, dung, cuttings, waste products, scrap (unwanted things)” (PortNV-LU1).
- Different types of waste: The teacher asked learners to identify waste in the school grounds and supported them to write the different types on the blackboard (using flash cards to scaffold the activity) (ONV1).
- Definition of recycling and re-use: The learners wrote definitions – copied from the board.
- Definition of compost: The teacher explained in class with dialogue such as:

Teacher: Who knows the word 'ukuvundisa' [to make something rot]?

Learner: You dig a banana peel in a hole.

Teacher: After they rot they become one product. (ONV2)

Or, as reported in the portfolio:

The teacher explains to learners the word compost as “nature’s own and oldest method of organic waste disposal and soil fertilisation” (PortNV-LU2).

b) Nature and causes of the waste issue

- Problems with unmanaged waste: The teacher explained in class: Waste causes germs, make us sick (including TB, asthma and rashes), bad smell, and flies (ONV1). Teacher gave them a rhyme to sing and copy into their books.
- The problem with unmanaged waste was also explicated through understanding the value of recycling for the environment. The teacher explained in class, for example, “many trees are saved from being chopped down for firewood and to make paper and furniture” (PortNV-LU1). In the first lesson plan, learners copied the following from the board (translated from Photograph 4):

Dirty things

Thrown around

Cause germs

Germs cause diseases such as rash

And TB

- This knowledge was revisited in lesson plan 3 where learners wrote point-form notes about the value of recycling from the board. This information is reflected in the following translation of a learner’s writing from Photograph 12:

Recycling: change things that have been thrown away to make a new thing, for example, bottles, paper, plastic and tins

Re-use: to use something to make another thing

How it helps us:

1. *To learn*
2. *Keeps our place clean*
3. *Reduces the dirtiness of the soil and water*
4. *We must look after things (trees and soil).*

- Value of using compost: Learners wrote short pieces on the value of compost. A translation of Photograph 9 reflects one learner's knowledge:

"What is the importance of compost?"

Compost fertilises flowers and fruits so they can grow good food. We must look after the soil and feed it before and after we grow things in it".

c) Problem-solving knowledge regarding the issue of waste

- How to make paper: Learners ordered and labeled pictures of the paper making process.
- Making useful items from waste: Nokhanyo displayed products such as a vase made out of a 2L plastic bottle. They discussed what products could be made from what waste.
- Alternative ways of managing waste: Nokhanyo asked the learners to say what they could do. They suggested: 1) Use rubbish bins, 2) Dig and bury, 3) Re-use (ONV1).
- How compost is made: The teacher shared this through bringing in ingredients, showing them a poster and sending them to do an enquiry in the community. The teacher commented on this enquiry saying: "Even though some learners jumbled the information [from their community research], they do have ability to remember and report the investigation" (PortNV-LU2). After feedback, learners produced their own reports.
- One learner's knowledge is reflected in the following translation of Photograph 8:

What is compost?

(a) Compost is what we add to plants so that they can grow.

Investigate how you make compost.

(a) you take cow dung

(b) leaves of plants

(c) fertiliser

Ask measurements and time

(a) you pour cow dung when you are about to plant

(b) the soil should always be moist

(c) then you can plant

When should you water?

- (a) every day*
- (b) morning and evening*

Besides the scientific concepts elaborated on above, Nokhanyo also introduced an ethical discourse into her lessons. For example, she used a story designed to illustrate learners' right to a healthy environment. This was a story about a girl who was concerned about a dirty environment. She decided to do something. She went to the municipality and asked them to provide her with bins. They obliged and she placed them strategically in the community. The situation then changed (ONV1). At the same time as highlighting rights, Nokhanyo also highlighted responsibilities by asking children "is it right to do that" with respect to waste dumping and burning of waste (ONV2).

The social and scientific and value-based knowledge described above, provided capital which learners could use to support critical engagement with waste issues. Evidence that reflects how this knowledge was used in critical and reasoned deliberation and co-engagement is presented in the remainder of this section. The worksheet for investigating litter in their community required learners to ask their parents if it was "good or bad to litter", while not asking for justification through any critical questions such as "Why do you say this"? While there was no evidence of any discussion around these value judgements directly linked to these activities, reasons why littering and burning were harmful to health and environment were discussed in an observed classroom activity. In this activity, Nokhanyo's learners were pressed to think critically when she asked them to motivate their reasons for waste management decisions. She asked what we should do with waste. One learner said: "We must burn it". Another said: "Put it in a refuse bin". Nokhanyo asked if burning is good – some answered "yes", others "no". She asked "why it is bad?" Drawing on scientific knowledge they answered that: "Smoke pollutes". She asked what smoke does but they could not answer and she then prompted them with "lung problems, chest problems, negative affect on TB patients, asthma" (ONV1). Another question in the worksheet investigating litter was "where does the litter come from and why it is lying around?" The answer in the learner's work provided was limited to "people and animals" but there was no evidence of a critical consideration of why it was lying around. The question "What causes litter?" was also answered superficially by the answer "papers, plastic, box" (PortNV-LU1).

The enquiry worksheets used in the first lesson plan helped learners with significant questions for exploring waste issues in context. For example, what types of waste were there, what animals were there, whether the area was secured by fencing, its proximity to living spaces, the presence of adults, and the safety of people on the site. However the worksheet was

limited in that the learners were not asked about the implications of these observations. For example, if there was no fencing, what was the significance for the safety of the surrounding community, or if there were flies, what was the significance in terms of health for the surrounding community?

7.2.2 Teacher 2: Weliwe

The data contributing to this section comes from Weliwe's school and community profile (SCP2), teacher and classroom profile (TCP2), the observation conducted during a school visit (OWG1), the interview with the teacher (I2), the portfolio activities (PortWG LU1, LU2 and LU3), and the portfolio lesson plans (LP1WG, LP2WG and LP3WG). The sections that follow draw on this data to present a school and community profile, teacher and classroom profile, a description of activities and curriculum requirements selected for three lesson plans, and a description of the emergent active learning processes across two lesson plans including links to school and community action projects.

7.2.2.1 School and community context

At the time of the research, Weliwe was teaching at a junior primary school (School 2 – Figure 1.2) in Mdantsane, a large 'township' outside of East London (Section 1.6). The school offered classes for Grades 1 to 4. The school was involved in a permaculture training project and the Eco-Schools programme. They had received their first Eco-Schools award in 2005⁴², registered without submitting in 2006, achieved an award in 2007, did not register in 2008 and received an award in 2009. In 2010 and 2011 they did not register. At the start of the Schools and Sustainability course they had already instigated projects in the school such as 'greening' (PLATE 5, Photographs 16,17 and 18), a food garden (PLATE 5, Photograph 19), a herb garden (PLATE 5, Photograph 20) and a system for reducing littering in the school due to the influence of WESSA and the 4H⁴³ school health programme. The school had been provided with garden tools, seedlings, a cooking stove and rain tanks to support their projects.

⁴² Each year registered Eco-Schools need to submit a portfolio illustrating their environmental management activities, and curriculum and project work. According to set criteria they receive awards as levels of engagement and commitment to the process increase.

⁴³ This is a programme initiated by the South African Departments of Agriculture and Education, introduced. The name stands for Head, Heart, Hands and Health. Through the programme, learners are taught and guided to plant vegetables in their school gardens for own consumption.

The projects were also supported by a good relationship with the school governing body whose members encouraged parents' participation. They participated in the food gardens, and also attended some of the workshops. Parents were enthusiastic participants in environmental days (SCP2). Weliwe was encouraged by an initiative inviting the parents to monthly classroom meetings where issues such as how to look after books were discussed (I2). The principal was supportive by facilitating a time for discussing environmental issues during school meetings and also providing funding for environmental activities (SCP2).

Weliwe cited a high rate of unemployment, poor health, HIV/AIDS, and orphans as particular problems in the community (SCP2, I2). She explained that most of the learners live with their grandparents. Even though Weliwe felt the amount was too little, her school took responsibility for communicating with social development workers in terms of social grants for families (I2). The school was dependent on the school feeding scheme for children who brought no lunch to school and for some who received no breakfast at home.

7.2.2.2 Teacher and classroom context

Weliwe taught Grade 1 learners – all first language Xhosa speaking. There were 17 children in her class. She initially left school after Grade 8, did a teachers diploma, then completed her matric, following which she did a three-year Senior Education Certificate at Rand Afrikaans University and then a Bachelor of Arts degree at UNISA. She continued her studies and completed an Advanced Certificate in Education (Technology) through the University of Fort Hare. She described herself as “someone who is curious and likes education” (I2).

Weliwe was a dedicated teacher who arrived at school early and provided educational activities for learners while they waited for school to open. She explained: “Some of the things need motivation to do – for the sake of knowledge and for the sake of the profession you know. You mustn't do things for the sake of money or promotion or what” (I2). Parents often requested her as a teacher (I2). She believed that teaching is about “education, and commitment, and responsibility, and above all – love and caring” (I2). Her dedication was also evident in her statement that “you are looking to learners holistically. Their needs, their emotions ... I used to visit some of their homes, so that I can have a clear understanding about them ... because there are some who need special love” (I2). She had been inspired by her Christian faith to love the environment and took on roles such as feeding birds with the crumbs left over from the feeding scheme (I2).

At the start of the course, teaching methods most often used by Weliwe were lectures, practical classroom work and learners copying from the board. Methods least used were learners researching information and researching in the community (TCP2). The observed lesson (OWG) was conducted in Xhosa, and Weliwe used English worksheets from a textbook, and developed her own resources some of which required responses in Xhosa and some of which required oral responses in English. If they required an English response, Weliwe wrote the answers given by the learners.

She described the environment as “the world we live in, especially the plants, animals and things around us which can make our lives nicer or nastier” (TCP2). From her involvement in projects, Weliwe gained knowledge of: “how to maintain soil; how to plant; intercropping; link of environment to curriculum; to love and protect nature” but, at the start of the Schools and Sustainability course, she still felt she needed more knowledge of environment (TCP2).

7.2.2.3 Teaching and learning activities

Weliwe developed two lesson plans. The detail presented below is based on Weliwe’s portfolio of evidence where she presented lesson plans focusing on waste, reuse and recycling.

Lesson Plan 1

This lesson plan combines the requirements of Learning Unit 1 (developing activities to help learners to work with information) and Learning Unit 2 (developing activities to support enquiry and action). The activities focused on waste management with an enquiry measuring waste reduction after implementing waste management techniques in the classroom. The lesson plan sought to address the following curriculum requirements outlined in Table 7.4 below:

Table 7.4 Curriculum requirements selected for Weliwe’s first lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 1 (Grade 1): Explains steps to ensure personal hygiene and links these steps to environmental health	Knowledge (Implicit): Keeping body clean, healthy and tidy; an unhealthy environment will impact on one’s personal hygiene Skills (Implicit): Learners able to look after own hygiene Values (Implicit): Concern for personal, community and environmental health

Integrated Learning Area: Mathematics	
LEARNING OUTCOME 5: DATA HANDLING The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation ASSESSMENT STANDARD 1 (Grade 1): Collects everyday objects in the classroom and school environment according to given criteria or categories ASSESSMENT STANDARD 2: Sorts physical objects according to one attribute chosen for a reason ASSESSMENT STANDARD 6: Describes own collection of objects, explains how it was sorted, and answers questions about it	Knowledge (Implicit): Topic of the mathematical enquiry dictated by the context of the enquiry Skills (Explicit): Collects, sorts, describes and interprets data Values (Implicit): The Mathematics curriculum sees Mathematics as enabling learners to “contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks” (South Africa. Department of Education, 2002f: 5)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: The teacher used a poster to stimulate discussion about cleanliness (PLATE 6, Photograph 21).
- Activity 2: The teacher defined waste as something not needed and thrown away. Learners made a poster of things that could be waste (PLATE 6, Photograph 22).
- Activity 3: Learners looked at different bins and completed a worksheet about where each was found (inside or outside) (PLATE 6, Photograph 23).
- Activity 4: Teacher talked about waste management – collection, transporting and disposing; as well as individual responsibilities with waste management.
- Activity 5: Teacher showed learners a picture of waste management practices (extracted from a textbook) which was discussed in class (PLATE 6, Photograph 24).
- Activity 6: Learners were taken on walk and drew pictures using a picture-scope (drawing what they could see through a toilet roll) and discussed findings back in the classroom. The teacher told learners about the dangers of dumped rubbish.
- Activity 7: Learners were shown a poster of different types of waste and completed a worksheet counting items of litter and answering questions about relative amounts (which was more, less or the same) (PLATE 7, Photographs 25 and 26).

It appears that these activities were intended to link the problem of waste management to the Life Orientation interest in personal hygiene. The Mathematical interest in data handling was addressed through counting different items of litter. The lesson plan shows evidence of the teacher responding to the Learning Unit 1 task of finding, using and adapting information (through using a poster to stimulate a discussion on cleanliness, another poster on waste management practices in the school yard and pictures of different types of bins which learners had to label in terms of where they belong). The lesson plan also illustrates a response to the Learning Unit 2 of developing activities to support qualitative and quantitative enquiry (Section 6.2) where the teacher found and used a quantitative worksheet for counting items of waste and developed her own auditing activity for learners to note changes in the amount of waste in bins in the classroom over time.

Lesson Plan 2

For Learning Unit 2 teachers were tasked to develop a lesson plan supporting learners to work with important information, conduct enquiries and respond through direct or indirect action (Section 6.2 and Table 6.1). This lesson plan, illustrating all three of these dimensions of active learning, continued the focus on waste management, exploring re-use (making objects out of waste) and recycling (recycling paper to make balls and recycling organic materials to make compost). The Life Orientation, Mathematics and Technology curriculum requirements selected by Weliwe are outlined in Table 7.5 below.

Table 7.5 Curriculum requirements selected for Weliwe's second lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health. ASSESSMENT STANDARD 1 (Grade 1): Explains steps to ensure personal hygiene and links these steps to environmental health.	Knowledge (Implicit): Keeping body clean, healthy and tidy; an unhealthy environment will impact on one's personal hygiene Skills (Implicit): Learners able to look after own hygiene Values (Implicit): Concern for personal, community and environmental health

Integrated Learning Area: Mathematics	
LEARNING OUTCOME 5: DATA HANDLING The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation. ASSESSMENT STANDARD 1 (Grade 1): Collects objects in the classroom and school environment according to given criteria. ASSESSMENT STANDARD 2: Sorts objects according to one attribute chosen for a reason. ASSESSMENT STANDARD 6: Describes own collection of objects, explains how it was sorted, and answers questions about it.	Knowledge (Implicit): Topic of the mathematical enquiry dictated by the context of the enquiry Skills (Explicit): Collects, sorts, describes and interprets data Values (Implicit): The Mathematics curriculum sees Mathematics as enabling learners to “contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks” (South Africa. Department of Education, 2002f: 5)

Integrated Learning Area: Technology	
LEARNING OUTCOME 1: TECHNOLOGICAL PROCESSES AND SKILLS: The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies ASSESSMENT STANDARD 2 (Grade 1): Chooses from a given range, materials or substances that can be used to make simple products ASSESSMENT STANDARD 3: Makes simple products from a range of materials provided	Knowledge (Implicit): Knowledge of uses of different materials and ways of processing them and combining them. Skills (Explicit): Makes a product Values (Explicit): Valuing ethical and responsible practice (Implicit): The purpose of Technology is stated as (when developing products) the need to “learn to minimize the potential negative impacts that their solutions could have on the environment and on human rights” (South Africa. Department of Education, 2002i: 4)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: The teacher discussed national laws around waste management and asked learners questions about waste management practices and responses in the school.
- Activity 2: The teacher took learners for a walk around the school to monitor bins and look at places where litter accumulates. Learners collected litter into black bags and sorted collected rubbish into different types of waste. The teacher asked questions about why one type of waste was more prominent than others (PLATE 7, Photograph 28).
- Activity 3: Waste reduction through reuse and recycling was discussed: making mulch with papers, composting, making objects, collecting glass bottles and tins for

recycling (see PLATE 8, Photograph 29 for the resource used to stimulate the discussion).

- Activity 4: Learners participated in making paper Mache balls. Learners made different objects from waste (pot plants, chairs out of match boxes, pencil holders). These ideas were stimulated by a textbook extract on how to make a pot plant holder and a pencil holder from waste (PLATE 8, Photograph 30).
- Activity 5: Assessment task: The teacher discussed compost with the learners and showed them the school compost heap. The learners then had to individually give their understandings in answer to five questions (see questions and answers in Table 7.6 below). The teacher wrote down each of their answers.
- Activity 6: Assessment task: Learners did an enquiry recording the reduction in waste in the bins in their classroom after the introduction of reducing, re-using and recycling initiatives in their school (PLATE 7, Photograph 27).

Table 7.6 Table representing teacher questions and learner answers regarding compost

• Teacher questions: 1. What is compost? 2. What sources do you need to make compost? 3. Will the compost help us in growing nutritious food to give to the needy? 4. What impact can compost have on the people in the community? 5. What are the benefits of compost?	• Answers Learner 1: 1. Compost are different kinds of waste put together and decompost 2. All types of waste 3. Yes 4. To make them get better harvest 5. Waste management
	• Answers Learner 2: 1. Compost is a form of recycle 2. Papers, plastics, leaves, grass, cans, old food, peels of vegetables, papers, grass, leaves 3. Yes 4. For good health 5. [Unanswered]

Although this lesson does not present evidence of direct links to the Life Orientation interest in personal hygiene, the discussion on waste law provided the foundation for learners to “make informed decisions regarding personal, community and environmental health” (Table 7.5 above). This information activity was followed by a qualitative enquiry activity about waste management in the school which enabled learners to respond to the Mathematical interest in “using mathematical tools to ... assess environmental problems and risks” (Table 7.5). These activities lead to the instigation of an action (reducing, recycling, and re-using initiatives in the school). This was supported by a worksheet which learners used to identify how different waste items could be re-used. This was followed by an enquiry (measurement of the reduction of waste in the classroom bins). These activities illustrated an influence of

Learning Unit 2 of the Schools and Sustainability course which required the inclusion of enquiry and action in the assessment task. The combination of the information activity highlighting waste law (Activity 1) and the action activities highlighting the enactment of these responsibilities (Activities 3,4 and 5) and enquiry activities monitoring of the success of the actions (Activity 6), respond to the implicit values elicited in the selected Mathematics and Technology curriculum requirements to “contribute responsibly to the reconstruction and development of society” and to “minimize the potential negative impacts that [technology] could have on the environment” respectively (Table 7.5 above). The first assessment activity (Activity 5) responded to the requirements of the Schools and Sustainability course to develop an assessment tool and also consolidated information about the link between recycling and environmental health. The connection of the second assessment activity (the enquiry for monitoring waste reduction) to sorting and describing collection of objects in Mathematics was not clear, and might have been better linked to a ‘measurement’ learning outcome in Mathematics (see Table 7.8).

WELIWE: PLATES 5 – 8

PLATE 5



Photograph 16: Walkway and planting to promote 'greening' of the school



Photograph 17: Old tables used to protect trees planted



Photograph 18: A successful tree donated by WESSA's tree planting support



Photograph 19: Vegetable garden showing mulching and intercropping as promoted in the permaculture system



Photograph 20: Phikisile Zondani looking at the herb garden WESSA was supporting

What a mess!

What an unsavory home!
Talk to a friend about this picture.

1 endhi

2 Phakathi endhi

3 endhi

4 endhi

5 Phakathi

6 Phakathi

Look at this picture.

Talk about all the things that cause litter.

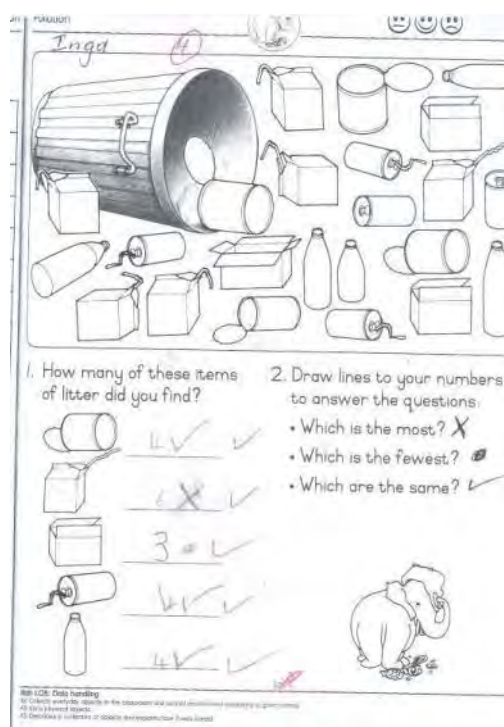
SCHOOL GROUNDS



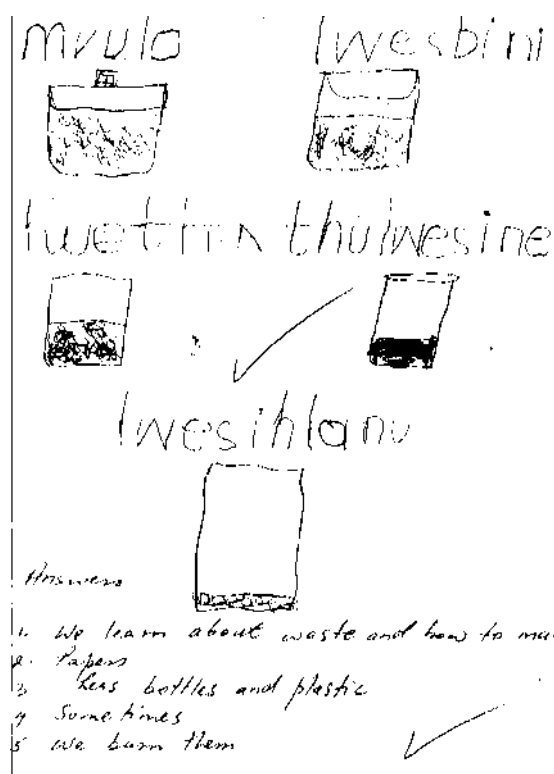
LIFE SKILL BOOK

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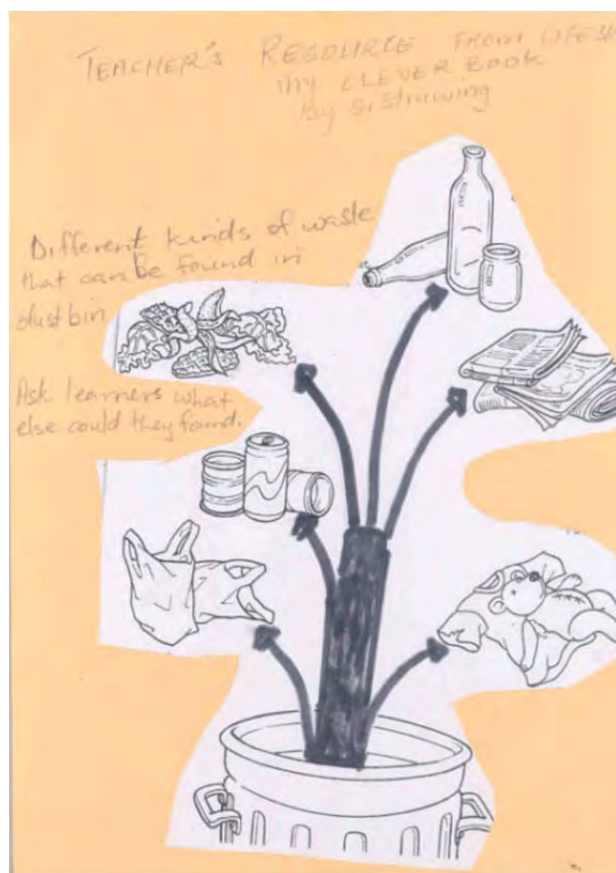
PLATE 7



Photograph 25: Worksheet completed by a learner in which items of rubbish were counted



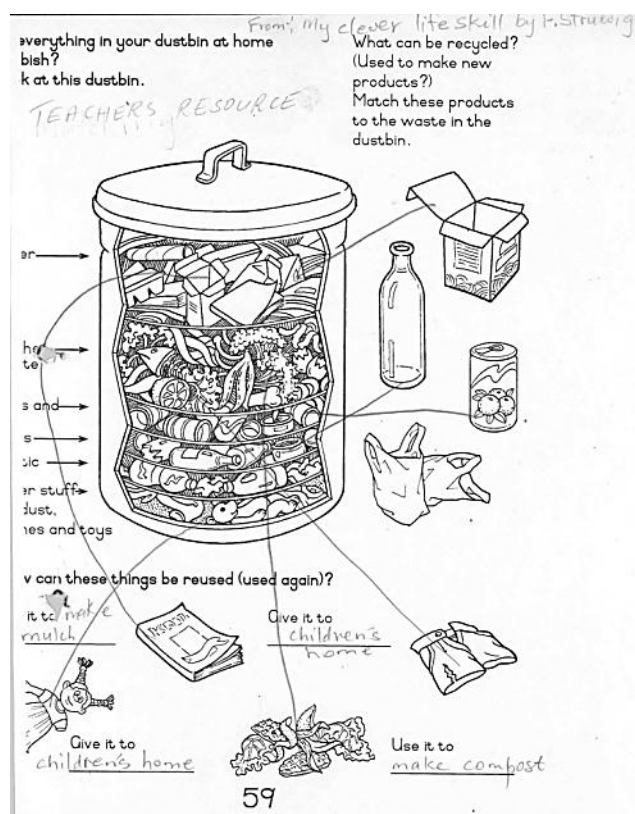
Photograph 27: A learner's representation of reduced litter in the classroom from Monday (mvulo) to Friday (lwesihlanu), followed by questions about the changes in waste



Photograph 26: Poster made by the teacher, showing different types of waste.



Photograph 28: Learners sorted waste into different types and counted the number of each type



Photograph 29: Teacher's resource for stimulating discussion about what to do with different types of waste (recycling or re-use)



Photograph 30: Activity sheet giving ideas for things to make from waste

7.2.2.4 Active learning process

This description of the active learning process discusses Weliwe's environmental learning activities across her two lesson plans with additional data from her portfolio (PortWG-LU1-LU3), interviews (I2) and observations (OWG1). The description follows the same logic and structure as Nokhanyo's description above – addressing the three key dimensions of active learning as identified in this study; namely situated learning, action orientation, deliberation and co-engagement.

Situated learning

As with the description above, this section includes consideration of the links between everyday knowledge and experience and abstract concepts introduced in the classroom. Weliwe situated her decision to focus on waste in her lesson plans by explaining that she had been looking for better ways to manage waste in her school and community. This had been sparked by her concern that “even me, I used to burn the long grass and the paper. But at least now I said we must not burn. So I told them not to burn. Because by burning we are fighting with the environment” (I2).

In the classroom the waste focus was situated for learners when they talked about how people at bus stops litter as do learners while they are walking to places. When exploring the reasons for waste in their community, Weliwe asked her learners why people litter. They responded with:

- 1) They don't care
- 2) They don't see the bins
- 3) There is a shortage of bins on way to school.

She added that another reason was laziness and that “they don't want to take responsibility because they don't feel ownership of their surroundings” (OWG1).

In order to look more specifically at what was happening in the school learners were taken on a walk around the school to see whether littering was a problem – learners counted the number of bins and looked at places where litter accumulated (PortWG-LU1).

With this situated understanding of waste in their local context, the teacher was able to choose appropriate actions for learners to take in their school. These actions addressed both the identified concern with a lack of responsibility and care (learners were involved in waste recycling, and re-use activities thus taking responsibility for waste reduction, and learners and

community were involved in litter clean-ups) and lack of appropriate waste management systems (learners ensured there were bins in appropriate places in the school). These actions are discussed in the next section.

Action orientation

In response to burning large volumes of waste, learners explored ways of reducing waste through recycling activities such as making balls for their physical education classes out of paper (OWG1, I2); recycling of cut grass by mulching, and recycling of organic material in a compost heap (PortWG - LU2); re-use activities such as making pencil holders from waste; and reducing through encouraging learners to bring refillable juice bottles to school instead of buying bottles each day (OWG1, I2).

Waste management was also addressed by requesting the vendors outside the school to pick up rubbish and organising learners to pick up rubbish during break (OWG1).

Section 3.4 discussed the importance that actions in environmental learning display an ‘authenticity’ and emphasise human development rather than behaviour change (Wals & Jickling, 2009: 78). Evidence of such development can be seen with learners taking ownership of ideas or exercising their voices beyond the classroom and using them in different contexts or sharing them with parents. Evidence of learners’ developing the power to exercise their voices beyond the classroom, was provided in Weliwe’s report that her learners were making a contribution by bringing vegetable peels from home for the Grade 4 compost making project. She had spoken to parents who had reported on how their children responded to waste at home. She commented that “so this is the way I think I reach the community, as the learners carry information from school to their homes” (I2). In another positive development, evidence of sustained impact of the activities was provided when Weliwe reported (in the year after she had done the Schools and Sustainability course) that her previous year’s learners had come to her and asked for ‘Kentucky containers’ [large polystyrene containers obtained from Kentucky Fried Chicken family meals] to re-use as bins in their new classrooms (I2).

Together with her concerns about burning waste, Weliwe also tried to stop the burning of grass in the school ground. Teachers clashed with her because of a fear of snakes in the long grass, and Weliwe then argued that grass should be used in the compost heap which could be later used to improve soil fertility in their vegetable garden. She felt that she had made a difference in influencing a love of nature as is evident from the following story she told about one of her learners who had been in her class during the 2008 Schools and Sustainability

course and was repeating the year in 2009:

So it enters the class [praying mantis]. They said 'Wo'. There is a boy who is a repeater due to other things. Last year I used to introduce to them to love the environment, you know. And animals and insects as well. So when that came in – we saw it here. Three boys come up and the one ready to stamp on it. But he [the learner repeating the year] said 'No. Don't kill'! Oo, I was impressed with that. So I dropped everything I do and pick it up and then we put it outside. (I2)

The above examples, illustrating learners' speaking up and acting for the environment indicate a development of 'willingness' and 'consciousness' which were described in Section 3.3.3 as key aspects of developing action competence.

Deliberation and co-engagement

As with the previous case study, this section presents the social, scientific and value-based engagements with the environment and sustainability concepts raised during the action activities in the above-mentioned activities.

The following list summarises the foundational social and scientific knowledge signified by the topics Weliwe introduced to her learners over the three lesson plans as well as an explanation of the methods she used with each new topic or concept. This knowledge is grouped in four categories, with the additional category of 'regulations or policy' not evident in the previous case: a) Definitions and concepts, b) Regulation/policy, c) Nature and causes of issues, and d) Problem-solving or 'how to' knowledge.

a) Definitions and concepts regarding the issue of waste.

- Definition of waste: The teacher explained that anything not needed and thrown away can be waste. Learners make posters of anything that could be waste.
- Different types of waste : The teacher showed learners a self-made poster of the different types of waste which was consolidated by a worksheet counting pictures of different types of waste and another activity where learners sorted waste collected in the school grounds.
- Learners completed worksheets showing different types of indoor and outdoor bins.

b) Regulations

- Waste regulation: The teacher told learners that to throw away your rubbish at homes and schools or anywhere else is a criminal offence. She also said that people responsible for maintaining public places must supply bins. (PortWG-LU2)

c) Nature and causes of waste issues

- Waste management: The teacher talked about collecting, transporting and disposing of waste.
 - Effects of unmanaged waste and litter: The teacher informed learners about how litter attracts flies, rats and other animals which could cause diseases. Litter in streets could be dangerous – causing cuts, infections and other diseases. She told them they should not play on rubbish dumps as we may touch poisons, medical waste and others.
- (OWG1)

d) Problem-solving with respect to waste issues

- Weliwe told learners that they could reuse and recycle by making mulch with papers, composting, making objects, collecting glass bottles and tins for recycling. She explained that burying or burning waste encourages us to continue producing more waste and that “removing from one place to another does not help either” (PortWG - LU2: pg. 16). Weliwe used this information (PLATE 8, Photograph 29) to guide her discussion about what to do with each type of waste.
- How to make compost: The teacher talked about compost and showed them the compost heap and they fed back their understanding to her orally.

In addition to this social and scientific foundational knowledge, learners also considered values with respect to waste and waste management. Weliwe felt that part of the reason that there was litter in the school and community was a lack of ownership and care. She addressed the problem by trying to inculcate values in learners to use dustbins and pick up litter not dropped by them (PortWG-LU1). She also addressed values education in a different way by making use of the poster, in lesson plan 1, to make the statement “What an unhealthy home” and to encourage learners to talk about how they felt about waste and mess. In a similar activity, she handed out a worksheet illustrating a clean class and a dirty class. Learners were asked to choose which class was the best (OWG1).

The following replies to Weliwe’s question about what learners would say to someone they saw littering on the road are an indication that learners had begun to think critically in deliberative and co-engaged processes using their social, scientific and value-based knowledge:

- 1) I would pick [it up] and put in bin
- 2) I would ask them to put in bin
- 3) If it was a useful object I would pick it up to use. (OWG1)

further stimulated critical thinking about the complexity of waste management issues by questions she asked in class: “Would people litter less if there were more bins? What would you say and do if you see someone littering”? (PortWG-LU2). She noted that learners were coming up with their own solutions to problems such as one learner’s suggestion that they need to add more bins – one facing each class. At the same time, she noted that not all learners could satisfactorily explain why more bins were needed (PortWG-LU2). In lesson plan 2, Weliwe asked why there were less of certain types of waste. One learner pointed out that people litter fewer plastic bags now that they have to buy them (PortWG-LU2).

Reflexive thinking was stimulated in lesson plan 1 when learners were expected to see how the initiation of the above-mentioned recycling activities had reduced rubbish in their bins from day to day over the period of a week. One learner was able to answer why there was less rubbish in the bin each day (Question 1). This is reflected by his/her response that: “We learn about waste and how to manage it” (PLATE 7, Photograph 27). Through Question 5: “Why has the dumpsite less waste” the teacher appeared to be encouraging learners to note how their recycling and re-use activities in their lessons had reduced waste on the dumpsite, however the answers from three learners: “we burn it”, “we use the dustbin regularly” and “there is a hole” indicates that a number of learners had not grasped this point.

In lesson plan 2, learners appeared better able to argue the value of their actions. This was evident when learners were challenged to think critically about the benefits of compost and in their writing activity where they linked it to:

- waste reduction
- providing a better harvest in the vegetable garden to feed the needy
- providing an income for a family.

7.2.3 Teacher 3: Nomonde

The data contributing to this section comes from Nomonde’s school and community profile (SCP8), teacher and classroom profile (TCP8), an observation during a school visit (ONM1), an interview (I3), the portfolio activities (PortNM LU1, LU2 and LU3), and the portfolio lesson plans (LP1NM, LP2NM and LP3NM). The sections that follow draw on this data to present a school and community profile, teacher and classroom profile, a description of activities and curriculum requirements selected for three lesson plans, and a description of the emergent active learning processes across two lesson plans including links to school and community action projects.

7.2.3.1 School and community context

At the time of the research, Nomonde was a Grade 1 teacher at a primary school (School 3 – Figure 1.2) situated close to the rural town of Peddie. The school offered Grades 1–7 and was faced with challenges including poverty, undernourishment and unemployment.

The school building was made of brick and was in good condition with sufficient space to house all the children (maximum 24 learners per class). Teachers used to live on the school grounds and there were old buildings still there in which they used to stay. They left because of theft and these buildings were in disrepair.

When asked if they did any environmental education activities at the school, Nomonde said these were limited to intermediate and senior phase excursions. The school had a garden. In 2007 the Grade 7s grew vegetables in it to raise funds for their tour. In 2008 it was the responsibility of the Grade 1s and Nomonde was managing it because of the possibilities for Eco-School links and because she wanted to use the vegetables to complement the school feeding scheme (at the time the learners received a slice of bread, with butter or jam, and a fruit juice each day). The Grade 7s helped in the garden though as they were big enough to handle the equipment. PLATE 9, Photographs 31 and 32 illustrate the Grade 1 vegetable garden.

Nomonde reported that she had introduced Eco-Schools to the stakeholders (DW1) but by the end of 2008 the school had not registered. The school first registered in 2009 and has done so up to and including 2011. They received awards in 2009, 2010 and 2011.

Nomonde believed that she had good support from the community, SGB and school principal. The school had been getting advice from those with experience from a community gardening project which had grown and sold vegetables to the community. The local Department of Agriculture had supported this irrigated community garden and provided the community with seeds for vegetables and herbs, but the project had closed in 2007 (I3).

In the school garden there had been problems with some people from the community coming over the fence and stealing vegetables, but Nomonde felt that they had had success talking to the community and asking them to be vigilant and identify culprits for the sake of the learners who benefited from the garden. The school had functioning rain tanks, but the water from these was needed for basic purposes such as drinking and was not available for use in the garden.

Nomonde was in charge of the girl guides in the school who were responsible for projects such as the rockery (PLATE 9, Photograph 33). She started this after an unsuccessful tree planting project which failed because of a lack of fencing and because she was looking for an alternative way of greening the school (I3).

The toilets were of the ‘pit’ variety, but in well maintained buildings. They were kept clean by a teacher in charge of learners. On certain week days, late coming learners were given the task of cleaning the toilets. Other latecomers were given tasks such as weeding the garden and picking up papers.

The school had a pit for rubbish. The learners were generally good about not throwing rubbish around, and to manage any litter, learners were expected to pick up litter after each break. A problem arose with management of waste as rubbish from the pit was often blown around by the wind and became difficult to manage. Every three or four days one of the teachers organised for the rubbish to be burnt (PLATE 9, Photograph 34).

7.2.3.2 Teacher and classroom context

Nomonde taught all learning areas for Grade 1. She had 15-24 learners in her classroom and all learners were first language Xhosa speaking. She had a Junior Primary Teaching Diploma (TCP8), and then gained an Advanced Certificate in Education (Environmental Education) after the course (she graduated in 2011).

When asked what makes a good teacher, Nomonde replied: “Attitude is the first one. If you want to be a good teacher, you must be positive and a good educator.... I don’t know whether passion is the good word for it, but you need to love what you are doing. And you must do everything you want to do” (I3). She added that the role of a teacher is to primarily bring education to the learners then cater for their well-being (I3).

At the start of the course she defined environment as: “Everything to do with surrounding” and sustainability as “keep it, maintain it, preserve, beautify if possible”. She described her strengths as “knowledge of importance of sound environment” and “appreciation of nature”. She described learners copying from the board and classroom experiments as her most common teaching methods. Learners researching and lectures were her most seldom used methods (TCP8). Learning and teaching support materials she used in the classroom included “textbook on nutritious food; flyers on human rights” (TCP8). Nomonde taught in Xhosa in the classroom and used Xhosa worksheets copied from textbooks or developed by her.

7.2.3.3 Teaching and learning activities

Like Weliwe, Nomonde only developed two lesson plans, choosing the option, in the third learning unit, of improving a previous lesson plan rather than developing a third one. Both lesson plans were focused on nutrition.

Lesson Plan 1

Tasked through the first course assignment to design a lesson plan to help learners to find, use and present environmental information (Table 6.1), this first lesson plan focused on the socio-economic complexities of food security as well as information for making healthy eating choices. The lesson plan was designed with the selected curriculum requirements outlined in Table 7.7 below:

Table 7.7 Curriculum requirements selected for Nomonde's first lesson plan

Main learning area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health	Knowledge (Explicit): Nutritious food is important (Implicit): Difference between fruit and vegetables, role of different food groups in the body, importance of a balanced diet, problems with junk food, value of fresh, home-grown food
ASSESSMENT STANDARD 1 (Grade 1): Identifies nutritious choices from a range of commonly available foods and drinks	Skills (Explicit): Makes informed decisions about food, makes choices Values (Explicit): Concern for personal, community and environmental health

Integrated Learning Area: Mathematics	
LEARNING OUTCOME 5: DATA HANDLING: The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation	Knowledge (Implicit): Knowledge focus influenced by the main learning area (in this case nutritious food)
ASSESSMENT STANDARD 2 (Grade 1): Sorts physical objects according to one attribute chosen for a reason	Skills (Explicit): Sorts, describes and interprets data Values (Implicit): The Mathematics curriculum sees Mathematics as enabling learners to "contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks" (South Africa. Department of Education, 2002f: 5)
ASSESSMENT STANDARD 6: Describes own collection, explains how it was sorted and answers questions about it	

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Using a food pyramid poster, learners pointed out individually what they had had for supper the night before (PLATE 9, Photograph 35). Nomonde highlighted that they should eat from each of the different sections in the pyramid (carbohydrates, fruit, vegetables, protein and sweet treats).
- Activity 2: Nomonde read a story she had written herself about a young girl who got ill from unhealthy eating. After the story Nomonde asked the learners to identify from the posters what they would plant in a garden that could improve the family's situation.
- Activity 3: Learners sorted pictures sticking them on to the board into categories of healthy and unhealthy foods (PLATE 10, Photograph 36).
- Activity 4: Learners completed a worksheet drawing lines to join foods (the same as those worked with on the board) to an appropriate healthy or unhealthy basket (PLATE 10, Photograph 37).
- Activity 5: Learners cut out healthy food pictures from magazines and stuck them on posters.
- Activity 6: Learners completed a worksheet identifying vegetables (PLATE 10, Photograph 38), another identifying food they liked (PLATE 10, Photograph 39) and another planning a healthy menu (PLATE 11, Photograph 40).

This lesson plan included activities responding to the Life Orientation interest in identifying nutritious foods (using the food pyramid, and categorising healthy and unhealthy food as a class (using the board) and individually (using a worksheet and cutting out healthy foods from magazines). This illustrated an emphasis on information as required by the Schools and Sustainability Learning Unit 1 and illustrated skills in both selecting relevant resources and using them creatively (by cutting up worksheets and asking learners to arrange them on the board). Learners were supported to consolidate this information by planning a healthy menu, thus emphasizing the Life Orientation interest in 'making choices'.

Lesson Plan 2

For Learning Unit 2 teachers were tasked to develop a lesson plan supporting learners to work with important information, conduct enquiries and respond through direct or indirect action (Section 6.2 and Table 6.1). This lesson plan extended the nutrition focus with an enquiry into eating habits at home which were reported in the form of a pictograph. Table 7.8 lists the curriculum requirements selected for this lesson plan.

Table 7.8 Curriculum requirements selected for Nomonde’s second lesson plan

Main learning area: Mathematics	
LEARNING OUTCOME 4: MEASUREMENT: The learner is able to use appropriate measuring units, instrument and formulae in a variety of contexts ASSESSMENT STANDARD 1 (Grade 1): The learner is able to use appropriate measuring units, instruments and formulae in a variety of contexts	Knowledge (Explicit): Measuring units, instruments and formulae Skills (Explicit): Using measuring instruments Values N/A
LEARNING OUTCOME 5: DATA HANDLING: The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation ASSESSMENT STANDARD 5 (Grade 1): Constructs pictographs where stickers or stamps represent individual elements in a collection of objects	Knowledge (Implicit): Knowledge focus dictated by the context of the enquiry (in this case – eating habits at home) Skills (Explicit): Critical analysis of data, constructs pictographs Values (Implicit): The Mathematics curriculum sees Mathematics as enabling learners to “contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks” (South Africa. Department of Education, 2002f: 5)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Using a poster Nomonde facilitated a discussion about what one should eat for breakfast, lunch and dinner.
- Activity 2: Nomonde facilitated a discussion about what would happen if you did not eat enough food.
- Activity 3: Learners discussed safe and unsafe eating situations as shown in pictures (using a poster about sick person and doctor).
- Activity 4: **ASSESSMENT TASK:** Learners did an enquiry at home using a worksheet to audit family eating habits (PLATE 11, Photograph 41). Learners conducted a self-assessment on what knowledge they had gained. Nomonde drew a graph on a poster to summarise the data for learners (PLATE 11, Photograph 42). She discussed the results with learners. The translation of the worksheet can be read in the graph (which was reported in the teacher’s portfolio in English).It contains a number of questions with options for respondents to tick:

Question 1: How many times a day do you eat?

** 2 times [a day] or less*

** 3 times and up*

** It depends*

Question 2: How often do you eat breakfast?

- * Always*
- * Do not eat*
- * Over weekends*

Question 3: How many glasses of water do you drink each day?

- * 7 glasses or less*
- * Seldom drink*
- * 8 glasses or more*

Question 4: We get water from:

- * Taps*
- * Tanks*
- * Other*

Question 5: How many nutrients [the teacher probably meant food groups] in a meal:

- * 1*
- * 2*
- * 3 or more*

Question 6: Do you have a vegetable garden?

- * Yes*
- * No*

Although, there was no evidence of teaching and learning support materials used in the portfolio, this lesson plan highlights the Learning Unit 2 requirement for developing activities to support learners to work with information (focusing on the importance of eating different food for different meals and enough food). The lesson provides evidence of supporting learners to conduct an enquiry in response to the Learning Unit 2 support for teachers to develop their own investigative tools – in this case a quantitative audit. Nomonde explained (I3) that the intention was to meet the Mathematical interest in measuring by asking learners to record numbers of glasses of water, although this was not actually done by ‘measuring’, but rather by asking family members. The lesson plan presents evidence that learners were able to collect data in response to the Mathematics interest in ‘data handling’. Although learners did not construct graphs individually, in an interview Nomonde explained that she had constructed a pictograph from the data as a group activity in the class (I3), thus meeting responding to the Mathematical interest in constructing pictographs. Evidence of a curriculum-linked action requirement of Learning Unit 2 is significantly absent here, although Nomonde did involve learners in growing vegetables in the school garden as an extra-curricular activity (I3).

NOMONDE: PLATES 9 - 11

PLATE 9



Photograph 31: The beds planted by the Grade 1s



Photograph 32: Mulch provided warmth for seeds recently planted



Photograph 33: Rockery started by Nomonde and the Girl Guides



Photograph 34: Learners picking up waste blown about by the wind

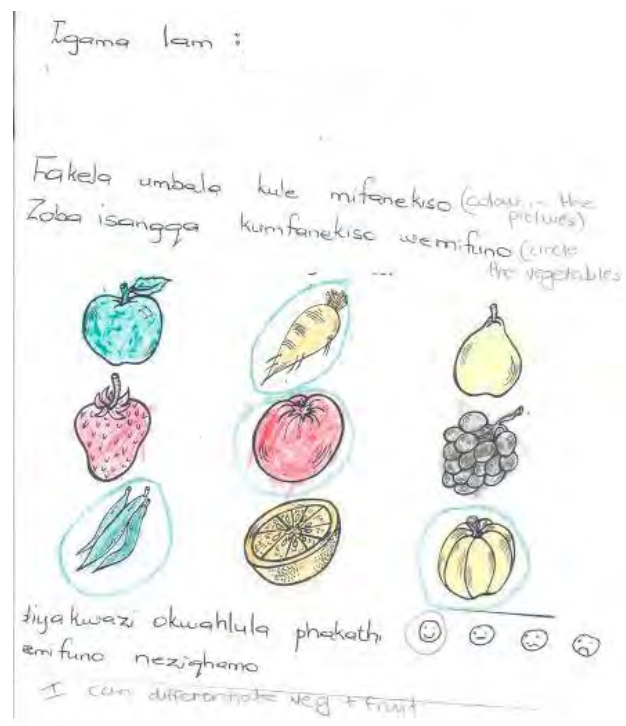


Photograph 35: Learners point out food they ate the night before

PLATE 10



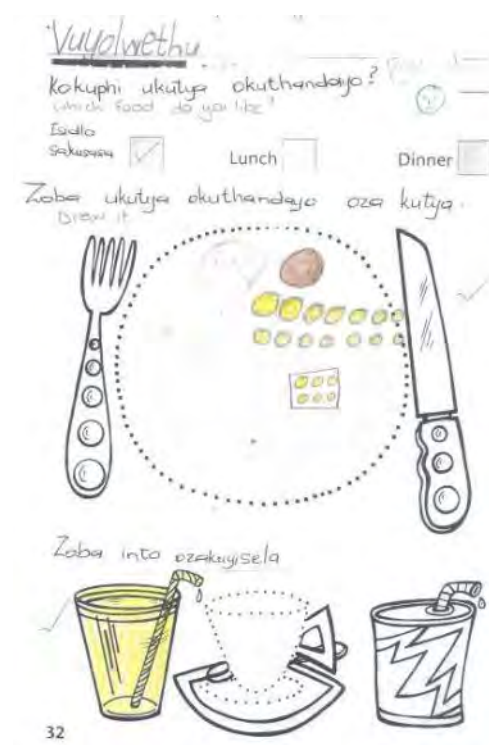
Photograph 36: Learners sort pictures of healthy and unhealthy food on the board



Photograph 38: Learner worksheet (identifying vegetables)



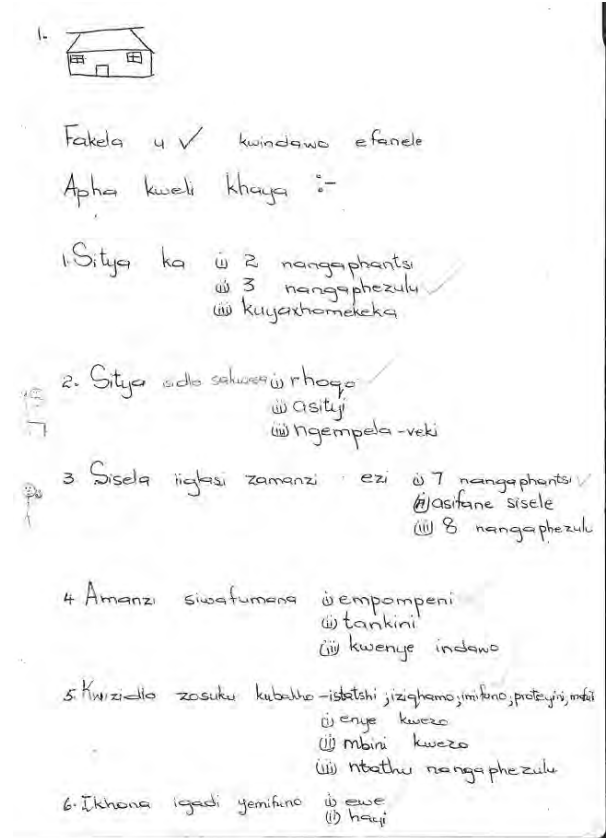
Photograph 37: Learners sort food into healthy and unhealthy



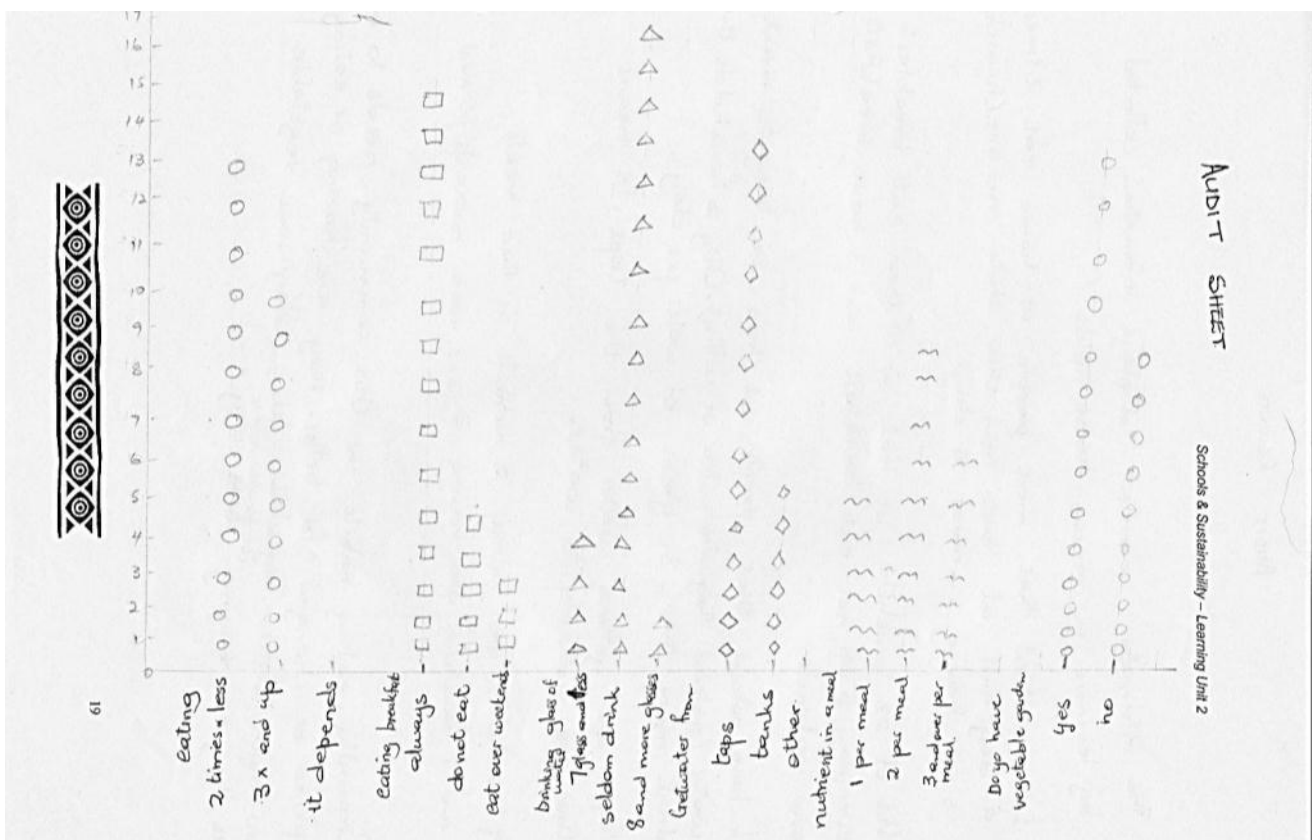
Photograph 39: Learners draw food they like



Photograph 40: Learners paste in a healthy menu



Photograph 41: Worksheet to audit eating habits



Photograph 42: Graph summarising results

7.2.3.4 Active learning process

This description of the active learning process discusses Nomonde's environmental learning activities across her two lesson plans with additional data from her portfolio (PortNM-LU1 – LU3), interviews (I3) and observations (ONM1). The description covers three key dimensions of active learning as identified in this study, namely situated learning, action orientation, deliberation and co-engagement. Each of these is discussed below. For ease of reference to particular activities, these have been referred to as LP1-A1, LP1-A2 etcetera.

Situated learning

In her lesson plans, Nomonde was able to make a link between everyday and abstract knowledge by relating the abstract concepts of 'food groups', 'healthy' and 'unhealthy', and 'balanced diet' to learners' own eating habits. In lesson plan 1, learners pointed out food they had eaten the night before and on another occasion learners looked at what they liked to eat. In lesson plan 2, learners audited their eating habits at home.

Nomonde's activities on nutrition were driven by a concern that children come to school hungry and that they are not receiving adequate nutrition in their diets. In her portfolio she commented that: "Generally the eating habits in this community needs to be uplifted or changed for better. They are having or eating too much starch. They seldom take indigenous vegetable as they are saying the environment is dry" (PortNM-LU2). In an interview she added that:

Almost, if not all the households [have an] unbalanced diet. They like to eat istiff pap[mielie meal] and a sweet or tea or mpoqoqo[crumbled mielie meal] and tea. It's very rare for them to say they had isigwamba [mielie meal with wild vegetables]. Because if they want isigwamba they must go doooown [here she implied a long walk into a valley]... (I3)

She further explained that learners do not bring lunch boxes to school and are dependent on the school feeding scheme (PortNM-LU2).

The audit in lesson plan 2 was an opportunity for Nomonde and learners to explore more detail regarding concerns about inadequate nutrition amongst learners. Nomonde needed to engage learners in a number of rehearsals, in order to complete this complex auditing activity. She explained how the learners rehearsed the interviews at school by practising on each other at break and then again in the classroom before they were sent out to do it in the field.

Teacher: I discussed it with them, but it took time. It took time ... the questions that they are going to ask from the household ... Those five questions ... We did it in the classroom – these questions.

Tutor: Each child filled in a sheet like this?

Teacher: Each person [filled in a sheet for three households]. So it took something like three weeks. Just to do this. We dramatised the questions ... what are we going to do? We are going to go to so and so and ask. (I3)

Once Nomonde's learners had collected information about eating habits in their community, they constructed a graph as a class representing the data collected and, using the graph, she discussed verbally with learners what food groups were predominant and which were limited in their community. This same graph was rewritten by Nomonde into her portfolio. It showed that there is some cause for concern about nutrition amongst learners. From the graph it is evident that (out of 23 learners) 10 learners ate three meals a day or more while 13 ate a meal twice a day or less; 15 always ate breakfast, five ate no breakfast and three only ate breakfast on weekends; seven learners had three or more food groups per meal, ten had two and six had only one per meal. Thirteen learners had vegetable gardens at home while ten had none (PortNM - LU2). This knowledge, lead directly to an interest in starting a food garden in school to supplement the school feeding scheme.

Action orientation

Section 3.4 discusses the problem with assuming that “whatever is agreed to be good, will therefore come into being” (Sayer, 2000: 178). The social-ecological issues discussed below illustrate this difficulty and raise the question of contradictions between what is known to be needed and what is possible in impoverished communities. It also raises the question of whether it is the role of education to solve community problems (Jensen & Schnack, 1997; Wals & Jickling, 2009: 79 – Section 3.4).

As mentioned above, the school attempted to extend their vegetable garden during the 2008 Schools and Sustainability course. However, in 2009 revealed that her intention to supplement the school feeding scheme had not quite been achieved as the yield had been low. There were a number of reasons for this low yield. Firstly a lack of tools and once tools had been obtained from home, the Grade 1s were too small to manage them (PortNM-LU3). Also, there was a shortage of water and the water in the rain tanks needed to be prioritised for learners to drink (ONM1). Attempts were made at mulching in order to conserve water (ONM1) and a small harvest was achieved in 2008 (I3). Also the soil was badly compacted so that, in 2008, the tractor was not able to loosen it much and in 2009 the tractor was damaged and not available (I3). In 2009 the community provided ostrich manure (I3), but the ongoing dryness and lack of a tractor meant there had been no success in the garden that year. Because of the low yield, the vegetables were sold and the money put into petty cash (I3). The

prioritising of vegetables for monetary gain over improved nutrition in the broader community is highlighted in the following conversation with Nomonde:

Nomonde: Some of the households are having those small gardens.

Ingrid: So nutritionally – do think that they are eating better. Have you seen their lunch boxes?

Nomonde: They don't bring lunch boxes. They depend on this feeding scheme. But at home they have not improved. Not improved. Because it is the parents. It is about money. It has not improved. Theoretically they know.

Ingrid: If they have gardens at home, do they not eat?

Nomonde: They do not eat, they sell. They sell most of the time. (I3)

An extract from an interview with Nomonde highlights the difficulty of tackling complex socio-economic problems in the classroom. The following is an exchange between the tutor (who was sitting in on the interview process) and myself, which arose while, together with Nomonde, we were trying to explore what it meant to guide learners in an action that could respond to the root of the nutrition problem.

Ingrid: You have done lots of very good activities where they know what is good and what is bad, so they can make the choices from magazines and from what is put in front of them. But I think part of the problem is that it is not put in front of them. They don't have that choice when they are at home and their parents ... you know ... So when we talk about an action for environmental learning, the action is to respond to the problem. And the problem is no longer that they can't make choices – as stated in the curriculum. The problem is that they don't have the choice. Am I right? Do you see what I mean? (I3, pg. 16-17)

Nomsa: They did not know nutritious foods because they are eating mealie meal most of the time. Doesn't it mean something will change [in the children's' diet] when they design menus?

Ingrid: They do not have the choice at home.

Nomsa: When they design it does not mean the food will be there?

Ingrid: Yes. It is a wish list.

Nomsa: It doesn't mean nutritious food will be there.

Ingrid: Yes

Nomsa: The idea is to have them get nutritious food?

Ingrid: Yes.

Nomsa: I understand. (I3, pg. 19)

In another dialogue, a different reason for a lack of change in learners' diet was discussed. In this discussion, Nomonde highlighted the fact that foundational knowledge does not necessarily change behaviour. She realised that despite knowledge of healthy eating children will still choose 'junk food' over a healthier option. She said: "If you put a fruit here – an apple, and here you put here a fizz pop; he is only going to jump for a fizz pop – even if he is so hungry. ... If you include a cabbage and stiff pap, they will opt for [the fizz pop]" (I3).

Deliberation and co-engagement

This section discusses the social and scientific and value-based engagements with the environment and sustainability concepts raised during the situated and action activities described above.

The following list summarises the foundational social and scientific knowledge signified by the topics Nomonde introduced to her learners over the three lesson plans, as well as an explanation of the methods she used with each new topic or concept. This knowledge is grouped in two categories: a) Definitions and concepts, b) Nature and causes of issues.

- a) Definitions and concepts regarding nutrition
 - Different food groups and balanced diet (including carbohydrates, fruit, vegetables, protein and sweets treats): The teacher used a poster to show food groups and learners planned a healthy menu.
 - Distinguishing between healthy and unhealthy food: Learners sorted pictures of food stuck on the board, completed a worksheet identifying healthy and unhealthy food, and cut out healthy food to stick on a poster.
- b) Nature and causes of nutrition-related issues
 - Importance of eating healthy food: The teacher shared this information in a classroom discussion. A translation from learners' work "I know that if I don't take water it will make problems with my blood" illustrates the knowledge capital learners drew on in order to understand the rationale for their enquiry (I3).
 - Relating the complexity of nutrition issues: This was through a story about a single working mother who was a hawker, too busy to look after her child properly. The characters in the story proposed a garden as an alternative.

Nomonde's assessment criteria for the self-assessment tool in lesson plan 2 demonstrated an interest in establishing learners' confidence (with 1 being the least and 4 being the most

confident) in the skill of enquiry, but with emphasis on the knowledge focus of the enquiry activity. The extract below illustrates a learner's confidence (numbers in brackets) regarding the following skill:

I managed to go to houses and ask how they eat (2)

And the following knowledge:

I know we must eat (3)

I know if you don't eat there will be problems in your body (2)

I know when you don't drink water there will be a problem with your blood (2)

Unclean water causes diseases (3)

You must eat healthy food (3)

While there was no evidence presented of explicit value-based interactions in Nomonde's lesson plans, a valuing of healthy above unhealthy food was implied.

Applying mostly scientific knowledge to making choices about their health, learners drew up menus reflecting a healthy and balanced diet.

7.2.4 Teacher 4: Nomhle

This data presented in this section is derived from Nomhle's school and community profile (SCP17), teacher and classroom profile (TCP18), two school observations (ONS1 and ONS2), an interview (I4), the portfolio activities (PortNS LU1, LU2 and LU3), and the portfolio lesson plans (LP1NS, LP2NS and LP3NS). The profiles and observations were undertaken in 2008 at the start of the study while the interview was done in 2011 at the end of the study after Nomhle had moved to a new school. The sections that follow draw on this data to present a school and community profile, teacher and classroom profile, a description of activities and curriculum requirements selected for three lesson plans, and a description of the emergent active learning processes across all three lesson plans including links to school and community action projects.

7.2.4.1 School and community context

Nomhle's school was a rural school about half an hour's drive from the closest town – Stutterheim (School 4 – Figure 1.2). It was a newly built school (2007) well fenced, with brick classrooms and good ablution facilities. The school offered Grades 1-7, however, because the buildings did not have enough classrooms, the foundation phase teaching took place in a detached wattle and daub structure with poor insulation and bad lighting (ONS1). PLATE 12, Photograph 43 shows Nomhle standing in the door of her classroom.

At the time of the research, the school had a large vegetable garden started by Nomhle, but she was struggling to establish the new garden on degraded soil in a dry environment (ONS1). The school had addressed this problem by mulching the beds (PLATE 12, Photograph 44). Specifically related to her Schools and Sustainability lessons, Nomhle started a small, separate garden with her Grade 1 and 2 learners (PLATE 12, Photograph 45). The overall intention for the garden was for it to supplement the school feeding scheme. At the time the learners received bread and butter every day with money provided by the Department of Education. There was a local woman employed to organise the food for the learners (ONS1).

Nomhle found the principal supportive and willing to assist financially. For example, he paid for a tap for the garden and for unemployed youth to do heavier work in the garden – for which they were given a small amount of money ‘to buy tobacco’ (PLATE 12, Photograph 46) (ONS1). The school governing body were also prepared to assist in the vegetable garden (SCP17).

The school worked with the Department of Agriculture, South Africa Forest Company Limited, the Wildlife and Environment Society and the Amahlati Municipality to support environmental projects (SCP17). In mid-2008 Nomhle reported that Eco-Schools had been introduced at a parents meeting. Parents were reluctant to volunteer to be on the committee, but they were nominated. An Eco-code was included in the school policy (DW1). The school did not submit a portfolio at the end of 2008, but registered and received an award in 2009. They have not re-registered the school since Nomhle left in 2010.

The surrounding community was faced with unemployment, poverty and illiteracy. Some homes were child-headed and others were run by grandparents (SCP17).

7.2.4.2 Teacher and classroom context

Nomhle taught all learning programmes to her eleven Grade 1 and 2 learners in what is commonly referred to as a multi-grade classroom – all were first language Xhosa speaking. Her formal qualifications were a Primary Teaching Certificate and a Bachelor of Education (Foundation and Intermediate). She had participated in workshops offered by the Department of Education (Literacy, Life Skills and Numeracy) and had participated in a Mathematics programme run by a non-government organisation. She felt confident in her ability to teach and to learn, and confident in her knowledge of the curriculum, but needed help with successful curriculum implementation.

Nomhle was an experienced gardener and had had success with a garden at the previous premises of the school and owned her own successful garden at home (ONS1). In a later interview Nomhle explained that she was planning to help her son with a farming endeavour on a plot of land he had bought (I4).

At the start of the course Nomhle cited her most common teaching methods as practical classroom work and classroom experimentation. She indicated that the least often used method was learners researching information while lectures were not used at all. Learning and teaching support materials available to her included an activity pack on food gardens; a field kit with practical activities for the food garden; magazines to differentiate between fruit and vegetables; and posters on nutritious food we eat. She made the point that she likes to use ‘textbooks that work’. Nomhle taught in Xhosa in the classroom and used English worksheets which she translated for learners and which they answered in Xhosa.

Inside the classroom, Nomhle had made a big effort to make her classroom look good. There was visible evidence of learning taking place in the posters pasted on the walls (they were not only decorative) (PLATE 13, Photograph 47, shows a self-made phonics poster for teaching Xhosa). She had also arranged insulation in the ceiling and had a blackboard and chalk.

Some learners in Nomhle’s classroom would not have food during the day if it were not for the feeding scheme. The learners came from quite a distance away, but there was a mini-bus that transported them to school which was paid for by the Department of Education (ON1).

7.2.4.3 Teaching and learning activities

Nomhle developed three lesson plans based on nutritious food. The detail presented below is based on evidence from her portfolio. The first focused on her Grade 1 learners and the other two on her Grade 2 learners. All of these lessons were linked to the school food garden.

Lesson Plan 1

Tasked through the first course assignment to design a lesson plan to help learners to find, use and present environmental information (Table 6.1), Nomhle focused on the value of different foods and lead a classroom discussion about eating habits at home. Curriculum requirements selected for this lesson are listed in Table 7.9 below.

Table 7.9 Curriculum requirements selected for Nomhle’s first lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health	Knowledge (Explicit): Nutritious food is important (Implicit): Difference between fruit and vegetables, role of different food groups in the body, importance of a balanced diet, problems with junk food, value of fresh, home-grown food Skills (Explicit): Makes informed decisions about food, makes choices Values (Explicit): Concern for personal, community and environmental health
ASSESSMENT STANDARD 1 (Grade 1): Identifies nutritious choices from a range of commonly available foods and drinks	

Integrated Learning Area: Social Science (Geography)	
LEARNING OUTCOME 3: EXPLORING ISSUES The learner will be able to make informed decisions about social and environmental issues and problems (e.g. wasting water, energy or physical resources; safe disposal of refuse or chemicals) [the issues]	Knowledge (Explicit): Issues affecting personal health or safety. (Implicit): Generic information about when personal health or safety becomes an issue Skills (Explicit): Identify issues, describe issues. (Implicit): In the introductory chapter the curriculum suggests an enquiry process that involves identifying, understanding and making choices regarding an issue (South Africa. Department of Education, 2002h: 49) and that learners “use a range of methods in the accurate presentation of information – in graphic and tabular format, and by using a variety of maps, photographs and images” (ibid.: 70) Values (Implicit): In this case children’s rights to food
ASSESSMENT STANDARD 2: Identifies and describes issues affecting personal health or safety in the school and/or home environment	

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Learners handled vegetables and plants brought by the teacher from her own garden (PLATE 13, Photographs 48 and 49). Grade 2s completed a worksheet distinguishing fruit from vegetables (PLATE 13, Photograph 50).
- Activity 2: The teacher told a story of hungry child – a child whose mother did not receive child support and was unemployed. The girl and her mother, with encouragement from the school explored the idea of starting a vegetable garden in their own home. The story brought up issues of poverty, food security and gender inequality and was linked to the South African Bill of Rights.
- Activity 3: The teacher led a discussion to explore what the learners eat, how often and how it is prepared. The following is a list of questions prepared by the teacher to guide this discussion:

- * *How often do you get food?*
 - * *Why don't you eat in the morning? What does your parent do to solve the problem of not having food?*
 - * *Who gives you food?*
 - * *What is your diet?*
 - * *Which food is eaten the most?*
 - * *How much food does your parent give to you?*
 - * *Is it cold or warm?*
 - * *Does your parent change the diet?*
 - * *Is the diet you eat balanced?*
 - * *Why do you say it is balanced? (LP1NS)*
- Activity 4: The teacher drew on a textbook to explain different food groups and what each does for the body. Assessment task: Learners listed different food groups and matched with food cut and pasted from handouts and magazines (PLATE 14, Photograph 51).

This lesson plan presented activities to support learners to work with information in response to the Learning Unit 1 assessment task and in response to the Life Orientation interest in 'identifying nutritious choices' (through activities requiring learners to distinguish fruit and vegetables and to list and provide examples of different food groups). In response to the Schools and Sustainability Course Learning Unit 1 emphasis on how to find, use and adapt information (Section 6.2), the lesson plan also provided information on nutrition-related rights (through the telling of a story) and supported an (informal) enquiry through the class discussion on learners' experiences regarding food and nutrition in their homes. The story and the discussion responded to the Social Science interest in identifying and describing issues affecting personal health (Table 7.9).

Lesson Plan 2

For Learning Unit 2 teachers were tasked to develop a lesson plan supporting learners to work with important information, conduct enquiries and respond through direct or indirect action (Section 6.2 and Table 6.1). In this lesson plan, Nomhle's learners conducted an investigation of nutrition at home. This was linked to Mathematics data handling and integrated with informed decision-making and problem solving in Life Orientation and investigative problem solving in the Natural Sciences (see Table 7.10 below).

Table 7.10 Curriculum requirements selected for Nomhle’s second lesson plan

Main learning area: Mathematics	
LEARNING OUTCOME 5: DATA HANDLING The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation ASSESSMENT STANDARD 1 (Grade1): Collects everyday objects in the classroom and school environment according to given criteria or categories ASSESSMENT STANDARD 2: Sorts physical objects according to one attribute chosen for a reason ASSESSMENT STANDARD 5: Constructs pictographs ASSESSMENT STANDARD 6: Describes own collection of objects, explains how it was sorted, and answers questions about it	Knowledge (Implicit): Topic of the mathematical enquiry dictated by the context of the enquiry Skills (Explicit): Collects, sorts, draws pictograph, and describes and interprets data Values (Implicit): The Mathematics curriculum sees Mathematics as enabling learners to “contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks” (South Africa. Department of Education, 2002f: 5)

Integrated Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 2 (Grade 6): Participates in a problem-solving activity to address an environmental health issue to formulate environmentally sound choices and/or actions (NOTE this assessment standard was meant for a higher grade)	Knowledge Explicit): Environmental health (Implicit): Knowledge focus dictated by the context of the problem – in this case, nutrition Skills (Explicit): Formulate sound choices Values (Implicit): Concern for personal, community and environmental health

Integrated Learning Area: Natural Science	
LEARNING OUTCOME 1: SCIENTIFIC INVESTIGATIONS: The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts ASSESSMENT STANDARD 2 (Grade 4): Conducts investigations and collects data (NOTE this assessment standard was meant for a higher grade)	Knowledge (Implicit): Knowledge determined by context of activity – in this case, nutrition. Core knowledge in this learning area regarding the values of different foods and the importance of a balanced diet is specified only at the Intermediate Phase Skills (Explicit): Conduct investigations and collect data, investigate, solve problems (Implicit): The scientific method is described as “certain methods of inquiry are generally used. They promote reproducibility, attempts at objectivity, and a systematic approach to scientific inquiry. These methods include formulating hypotheses, and designing and carrying out experiments to test the hypotheses.

	Repeated investigations are undertaken, and the resulting methods and results are carefully examined and debated before they are accepted as valid” (South Africa. Department of Education, 2002g: 4) and methods of representation are suggested such as posters, pie charts, graphs, concept maps and diagrams (ibid.) (Null): Knowledge of different investigative techniques and difference between qualitative and quantitative techniques Values (Implicit): The curriculum document stated that science should “prepare learners for active participation in a democratic society that values human rights and promotes environmental responsibility” (ibid.: 4)

Activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Learners sang a song about clean and healthy bodies (sung to the popular tune of Umziwatsha [London’s Burning]):

*Our bodies x2
Keep them clean
Keep them healthy
Eat some fruit
Eat some veggies
Drink clean water x2*

- Activity 2: Learners collected data about what they ate in the morning and afternoon and reported back at school. Each food type was assigned a different colour and learners coloured in circles to represent food eaten. The collected data was presented stuck on to posters by the teacher (in a large format on wall) (PLATE 14, Photograph 52).
- Activity 3: The teacher reminded learners about the importance of a balanced diet (see Lesson Plan 2).
- Activity 4 assessment task: On the board, the teacher showed the learners how to draw a pictograph (PLATE 14, Photograph 53). Learners drew their own pictograph on a worksheet and answered questions (PLATE 15, Photograph 54). With translation of the Xhosa, the questions and answers are represented below:
 - * Question: Which food appears the most? Answer: Bread and buttermilk
 - * Question: How many did not eat and why? Answer: 3 because the parents did not cook
 - * Question: What is the difference between the most frequent and least frequent food? Answer: 4
 - * Question: How many rice and mvubo [sour milk]together? Answer: 15

- * *Question: How many Weetbix [cereal brand] and isonka [bread] if each is doubled? Answer: 10, 14*
- * *Do you think the diet above is balanced? Yes*
- * *Why do you say so? It is nice*

The lesson plan followed on the previous lesson plan's information about the importance of a balanced diet (learners were reminded in Activity 3). In response to the Schools and Sustainability Course Learning Unit 1 emphasis on how to find, use and adapt information (Section 6.2), Nomhle used a worksheet copied from a textbook, helping learners to distinguish between fruit and vegetables. Responding to the Learning Unit 2 support for developing qualitative and quantitative enquiries (Table 6.1), Nomhle developed a quantitative enquiry where learners collected data about what they eat for breakfast which was consolidated in a pictograph representing the class's breakfast habits. The graph was used to support learners in manipulating numbers as well as to reflect on the meaning of the graph in terms of a balanced diet (although the question about a balanced diet can be argued to be problematic as can the associated learner's answer– see Section 7.2.4.4). This enquiry was linked to the investigative interests of two learning areas: Mathematics 'data handling' and Natural Science 'scientific investigations'. The lesson plan did not develop an action activity directly linked to curriculum requirements (as required for Learning Unit 2) but learners were involved in planting a garden (PLATE 12, Photograph 45) and Nomhle followed up in her personal capacity by supporting three families to secure a child support grant (Section 7.2.4.4). Thus, in her personal capacity, Nomhle illustrated how Mathematics and Science can respectively “contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks” (South Africa. Department of Education, 2002f: 5 – Table 7.10) and “prepare learners for active participation in a democratic society that values human rights and promotes environmental responsibility” (South Africa. Department of Education, 2002g: 4 – Table 7.10).

Lesson Plan 3

This lesson plan was linked to thinking and reasoning (particularly looking at similarities and differences) and writing in Home Language and used in the context of thinking about how to improve the school vegetable garden. It was also linked to personal development in Life Orientation (identifying positive aspects of self). Table 7.11 lists the curriculum requirements selected for this lesson plan.

Table 7.11 Curriculum requirements selected for Nomhle’s third lesson plan

Main Learning Area: Home Language	
LEARNING OUTCOME 5: THINKING AND REASONING The learner will be able to use language to think and reason, as well as to access, process and use information for learning ASSESSMENT STANDARD 2 (Grade 2): Identifies similarities and differences (e.g. like, the same as, different from) and classifies things	Knowledge (Implicit): Knowledge focus influenced by context – in this case, the school garden Skills (Explicit): Identifies similarities and differences (Implicit): The curriculum stated that language should be used to “read the world” critically considering issues such as “poverty, HIV/AIDS, the right to land, and consumerism” (South Africa. Department of Education, 2002d: 8) Values (Implicit): Further, the curriculum should “expand possibilities in relation to both human rights and environmental justice” (ibid.: 8)

Integrated Learning Area: Life Orientation	
LEARNING OUTCOME 3: PERSONAL DEVELOPMENT The learner will be able to use acquired life skills to achieve and extend personal potential to respond effectively to challenges in his or her world. ASSESSMENT STANDARD 1: Identifies positive aspects of self	Knowledge (Implicit): Knowledge of self; understanding of challenges and appropriate responses Skills (Explicit): Use of personal skills (Implicit): Ability to use personal skills in appropriate ways Values (Implicit): Valuing each individual’s potential to contribute to society

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Learners sang the song about healthy food – as in Lesson Plan 2.
- Activity 2: Learners looked at posters and discussed these in relation to differences and similarities (using conjunctions – ‘the same as’ and ‘different from’). Nomhle designed posters for this activity by taking photos of and labeling two different sections of the garden (PLATE 15, Photographs 55 and 56). The learners answered question posed by the teacher: *What do you think causes this garden to have good looking plants?* The learners then went to the garden and noted the differences and similarities in different plots and plants in the garden.
- Activity 3 assessment task: Learners discussed what was stunting some of the plants and what they could do to improve the conditions in certain sections of the garden and wrote down their responses. One of the learner’s work was translated from Xhosa as follows:
 - * *We add cow dung*
 - * *We must not be lazy to water the garden*

- * *We must get rid of weeds*
 - * *We must protect the garden with a fence*
 - * *We must plant a variety of vegetables*
 - * *We must make a plot* (PortNS – LU3)
- Activity 4 assessment task: Learners made a poster of an ideal garden which illustrated points of what to make to make a garden fruitful or good (PLATE 16, Photograph 57). Groups were assessed against the following criteria: Presentation, relevance of content, creativity, group involvement, and design/layout.

The activities in this lesson plan illustrate how a learning area without environmental content knowledge (Home Language) can be used to add depth and rigour to the exploration of environmental issues. In this case, the Home Language interest in ‘thinking and reasoning’ supported the systematic development of a critical thinking skill (discussing similarities and differences between gardens and the significance of these for growing vegetables). The information highlighted during this discussion was developed through integrating an information activity (discussion in class about what makes a garden healthy) and an enquiry activity (where learners looked at differences and similarities in different garden plots). The photographs used by the teacher to develop this enquiry show evidence of a response to the Learning Unit 2 support for teachers to develop enquiries – in this case a qualitative enquiry about different plots in the school garden. The assessment activities developed in order to meet Learning Unit 3 requirements (writing about what causes plants to become stunted and making a poster of an ideal garden) served to consolidate the information activities.

PLATE 12



Photograph 43: Nomhle at the door of her classroom



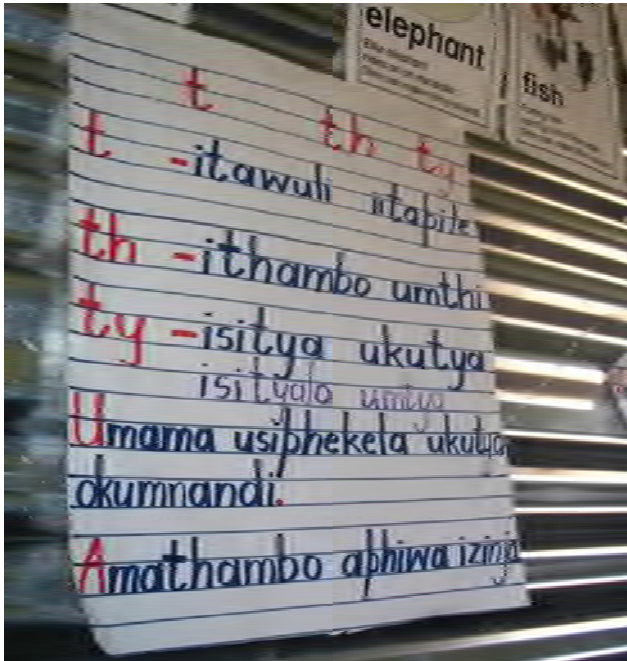
Photograph 45: Grade 1 and 2 vegetable garden



Photograph 46: Youth working in the school garden for a small payment



Photograph 44: Mulching in new school vegetable garden



Photograph 47: Classroom poster



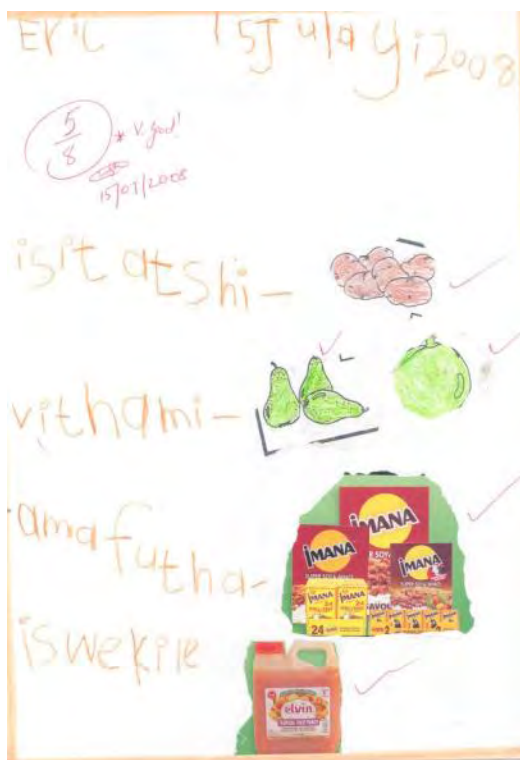
Photograph 49: Learners look at the vegetables brought by Nomhle



Photograph 48: Nomhle shows learners fresh vegetables from her garden



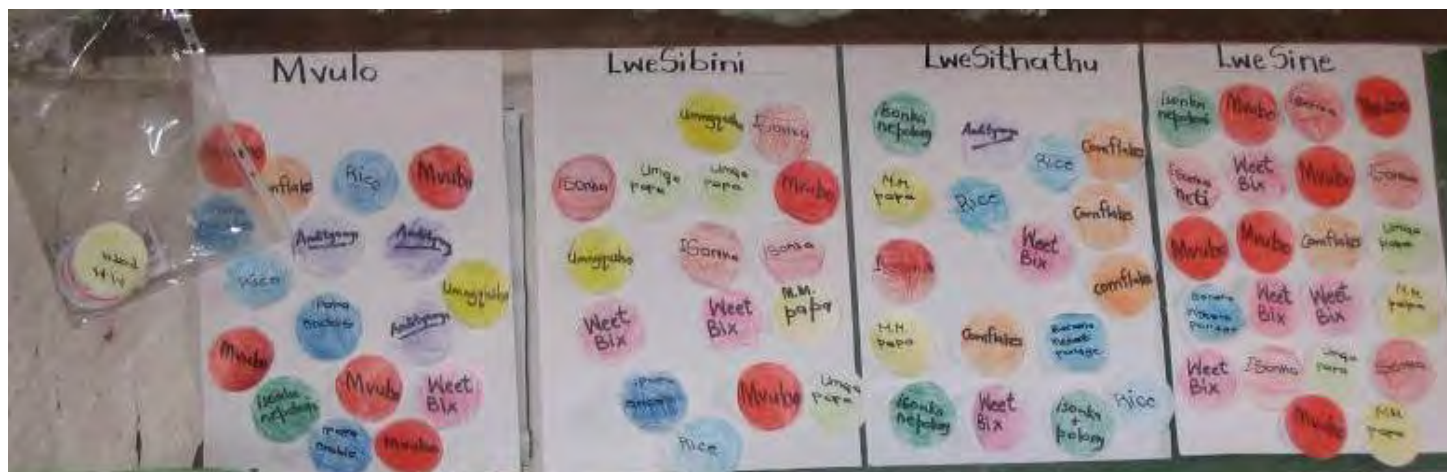
Photograph 50: Grade 2 learners complete a worksheet distinguishing fruit from vegetables



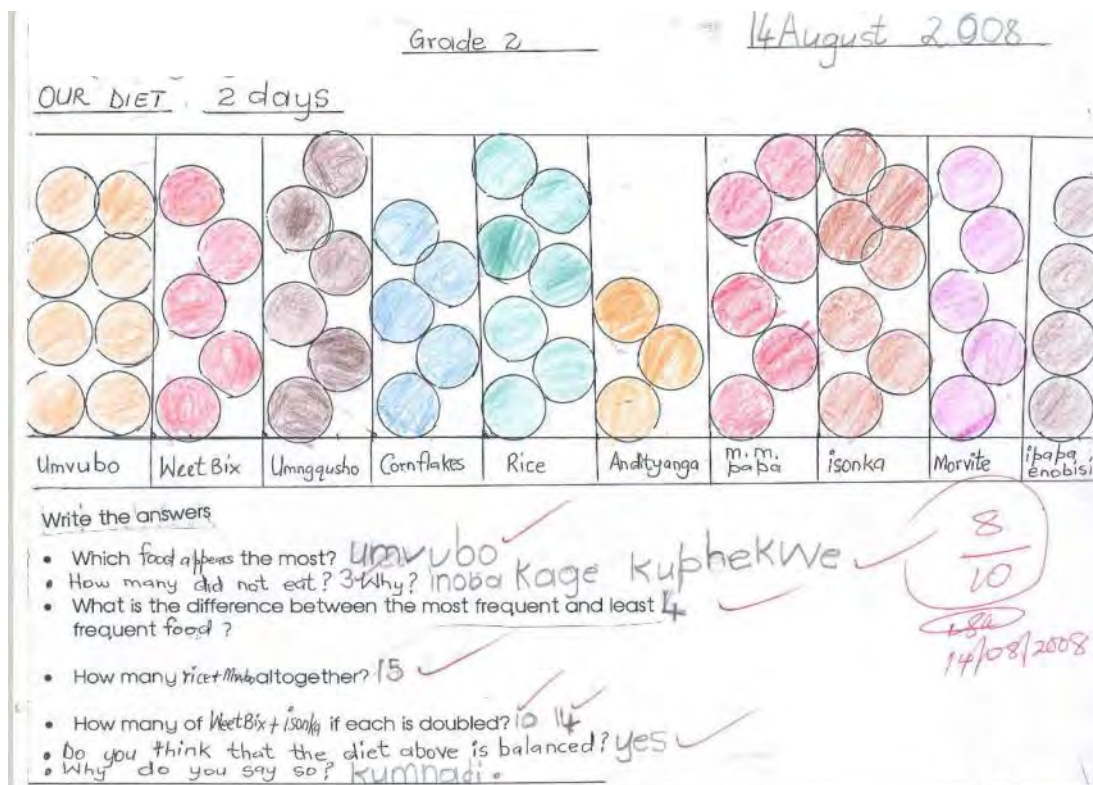
Photograph 51: Learners identify different food groups in different foods (starch, vitamins, protein and sugar respectively)



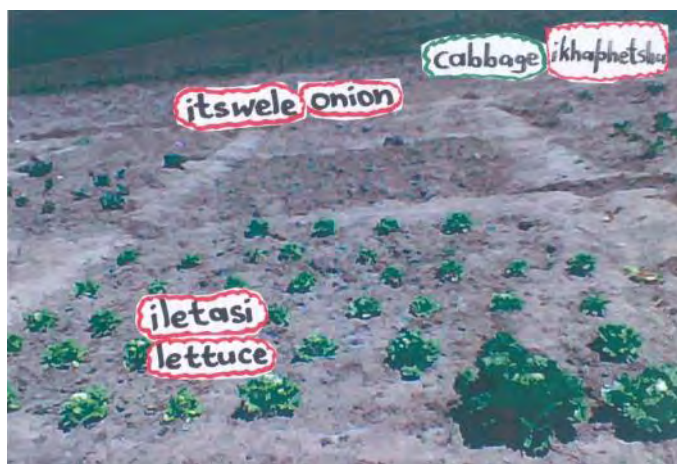
Photograph 53: Nomhle demonstrates for learners how to draw a pictograph



Photograph 52: Different foods eaten by learners on Monday (Mvulo), Tuesday (LweSibini), Wednesday (LweSithathu) and Thursday (LweSine)



Photograph 54:
Learner's work showing
what learners in the
class ate at home over
two days



Photograph 55: A labelled photograph made by
Nomhle given to learners to showing how one section
of the school garden differed from another



Photograph 56: Second labelled photograph given to
learners by Nomhle to stimulate discussion about
differences between different sections of the garden



Photograph 57: Learner presents her group's poster (The Carrots) about how to make a healthy garden

AUDIT RESULTS		GRADE: 2									
INVESTIGATING FOOD EATEN BY LEARNERS		MONDAY TO TUESDAY									
		MORNING AND LUNCH									
NAME	TYPE OF FOOD	UMVUBO	WEETBIX	UMNGBUSHO	CORNFLAKES	RICE	AMBITYANGA	M.M. A. PAPA	ISONKA	MORVITE	IPAPA ENGBISI
1. APRIL JAMKELISA		✓						✓	✓	✓	✓
2. BOMELA BUSISIWE		✓	✓			✓			✓	✓	
3. FLEPU PAMELIA		✓			✓					✓	
4. FLEPU SANEISIWE		✓			✓		✓	✓		✓	
5. FLEPU SIYAMTHANDA		✓			✓					✓	
6. MAHO VUYOLWETHU		✓			✓	✓		✓	✓		✓
7. MAMBU ANELE			✓		✓	✓			✓		✓
8. NANCAM AYEMA		✓	✓		✓	✓			✓		✓
9. NPAIPHILI ASEMAHLE		✓			✓		✓				
10. BONONDA SIMAMKELE		✓			✓					✓	
11. SIBOZI MIHULI		✓	✓		✓	✓	✓		✓		
12. TETHE LUKHANYO					✓						
13. TSHALA AVUJILE						✓	✓				
14. WONCI LUSANDA						✓	✓				
15. YEKELD SOASANGA		✓		✓		✓	✓		✓		

Photograph 58: Results of audit over two days of what learners were eating at home for breakfast and lunch (This table was drawn up by Nomhle separately from the group pictograph drawn by the learners)

7.2.4.4 Active learning process

This description of the active learning process discusses Nomhle’s environmental learning activities across her three lesson plans with additional data from her portfolio (PortNS-LU1 – LU3), interviews (I4) and observations (ONS1). The description addresses three key dimensions of active learning as identified in this study, namely situated learning, action orientation, deliberation and co-engagement.

Situated learning

Nomhle related lessons on nutrition to a discussion and research on learners’ home eating habits. As was the case with Nomonde, this enabled Nomhle to situate the abstract learning about nutrition (food groups, balanced diet, healthy and unhealthy) within the individual learners’ own experience. When learners drew a group pictograph of food eaten at home, they identified that three learners had not received food at home for breakfast or lunch for two days. Thus, the link between problems with home diet and the focus on nutrition illustrates how situated learning can facilitate education *through* the environment with its purpose of adding ‘reality, relevance and practical experience’ to environmental learning (Section 3.3).

In another case illustrating reality, relevance and practical experience, learners worked with pictures of their own garden in their discussion about the relative health of different sections in the garden. This gave them an empirical reality from which to discuss what the garden needed for improved success of the plants and thus set clear priorities for environmental action in the school. As highlighted in the case of Nokhanyo’s focus on compost, this activity could have been situated in terms of formal school knowledge by relating the need to add cow dung to nutrient recycling, aeration and water retention of soils; the need to get rid of weeds to relate to the ecological concept of competition; and the need to plant a variety of vegetables to the agricultural concept of companion planting and the ecological principle of mutualism (explained for young learners with an example such as ‘the sunflower attracts the bee which takes the pollen from one flower to the next’).

Action orientation

Through the story and classroom discussion, Nomhle introduced learners to different ways of addressing the problem of inadequate nutrition. Their knowledge of this was evident from a classroom observation where learners suggested “find wild vegetables, start a garden project and organise a grant for your mother” (ONS1).

In tangible responses, Nomhle's nutrition work had environmental impact in three ways. Firstly, limited to her own class, it was an intricately woven integration between the planting of a vegetable garden with the Grade 1s and 2s and a focus on nutrition and what is needed for a healthy garden (ONS1). In response to the need for a greater variety of food in their diet, Nomhle planted broccoli in the garden with her learners (PortNS-LU2). Nomhle raised a question in her portfolio reflections when she indicated that the purpose of her teaching learners about gardening was not to prepare them to become young farm workers in the future (PortNS-LU1). In another reflection on her work, Nomhle expressed concern over whether children would be able to request different food from their parents (PortNS-LU1). However, after Learning Unit 2, she noted that children were bringing a greater variety of food (namely fruit) in their lunchboxes (PortNS-LU2), thus indicating a change in practice amongst her learners.

Secondly, this garden contributed to the school's larger garden project which overall succeeded in growing green and red pepper, potatoes, onions, beetroot, cabbage and spinach. These vegetables were used to complement the school feeding scheme (learners were fed vegetables soup and stiff pap [a staple food in Xhosa culture] daily) and some vegetables were sold to parents and the proceedings were used to buy bread and jam (I4).

Thirdly, the lesson plan contributed to improvement in the lives of three learners. This came about when learners collected information about eating habits at home and used it to draw a pictograph. Nomhle, captured the same data in her own table (PLATE 16, Photograph 58) so that she could identify individuals not receiving enough food at home and respond as she described below:

It resulted in me taking some children and asking some social grant for them, because I discovered that they didn't eat in the morning. They come to school not taking anything and get food after school. And at their homes they didn't even have the birth certificates and so I took it further to the social development – and it was successful because three of them also successfully got their social grants.
(I4)

Deliberation and co-engagement

This section discusses the social, scientific and value-based engagements with the environment and sustainability concepts raised during the situated and action activities described above.

The following list summarises the foundational scientific knowledge Nomhle introduced to her learners over the three lesson plans as well as an explanation of the methods she used with

each new topic or concept. This knowledge is grouped in three categories: a) Definitions and concepts, b) Nature and causes of issues, and c) Problem-solving or ‘how to’ knowledge.

a) Definitions and concepts regarding nutrition

- Distinguishing fruit and vegetables and knowing the plants they come from: Learners handled vegetables and plants brought by Nomhle from her own garden (ONS1). Learners named vegetables as Nomhle held them up in class (ONS2). Grade 2s did a worksheet distinguishing fruit from vegetables (ONS1).
- Different food groups and their sources: Nomhle told learners about the different food groups (PortNS-LU1). Learners made posters representing different food groups. Nomhle noted, however, the difference between the oral responses and written work of learners. She was concerned that not all knew the different types of food and examples (one of three were able to do the activity) (PortNS-LU1).

b) Nature and causes of nutrition-related issues

- The importance of a balanced meal: The teacher told learners the importance of a balanced meal.

c) Problem-solving or ‘how-to’ knowledge

- How to improve the health of a vegetable garden: This was achieved through comparing healthy and unhealthy gardens.

Nomhle also engaged learners in values-based discourse regarding the socio-economic complexity of nutrition and rights for all children to a healthy diet. This complexity was introduced through the story presented in lesson plan 1. Considering the levels of poverty in the community, Nomhle discussed the question of the costs of food in class, thus highlighting that not everyone can afford to buy healthy food (ONS2).

With the above-mentioned social, scientific and values-based knowledge, Nomhle engaged learners in critical deliberative and co-engaged processes. That is, regarding the graphs they had drawn in lesson plan 2, she asked them: “How many did not eat”? This illustrated the problem of three children in the class who did not eat in the mornings. This was evident from the three circles placed in the ‘andityanga [I did not eat]’ column. Another significant critical question asked of learners was why they said their diet was balanced or not. This question is problematic because the question of balance cannot be asked of a group, but needs to be asked of an individual. Both learners whose work was presented in Nomhle’s portfolio struggled with the question, with both giving inappropriate answers (PortNS-LU2). This raises questions regarding scientific accuracy and rigour as important foundations for critical thinking exercises.

7.2.5 Teacher 5: Mhizana

The data used to structure this section comes from Mhizana's school and community profile (SCP4), teacher and classroom profile (TCP4), one school observation (OMM1), two interviews (I5a and I5b), the portfolio activities (PortMM LU1, LU2 and LU3), and the portfolio lesson plans (LP1MM, LP2MM and LP3MM). The sections that follow draw on this data to present a school and community profile, teacher and classroom profile, a description of activities and curriculum requirements selected for three lesson plans, and a description of the emergent active learning processes across all three lesson plans including links to school and community action projects.

7.2.5.1 School and community context

At the time of the research, Mhizana was teaching Grade 1 learners at a lower primary school (School 5 – Figure 1.2) located in a peri-urban area near King Williams Town. The school offered Grades 1 to 4 and served learners from both the formal and informal settlements in the area as well as from neighbouring farms (I5a).

At the time of the research the school participated in the Department of Agriculture's 4H Programme, the Eco-Schools programme, and had tried to start up a permaculture programme under EduPlant⁴⁴. In mid-2008 the school had chosen members of an Eco-Committee, written an Eco-code and planned a way forward for their garden (DW1), however they had not officially registered with the Eco-Schools programme and did not submit an Eco-Schools portfolio – Mhizana felt lack of support from the rest of the school had hindered this process.

They had gained support (trees and seedlings) for their gardening projects from the regional office of WESSA (PLATE 17, Photograph 59). They had a vegetable garden (PLATE 17, Photograph 60 and 61), a herb garden (PLATE 17, Photograph 62) and a recycling programme at the start of the Schools and Sustainability Course, although the garden was suffering due to poor soil, lack of tools and lack of human resources. The School Governing Body and the principal were supportive at the start of the course (SCP4).

⁴⁴ EduPlant is a programme run by a South African non-governmental organisation Food and Trees for Africa. The EduPlant programme supports permaculture gardening in schools through offering workshops to teachers.

In 2011 Mhizana registered as an Eco-School for the first time and felt she would succeed in getting other teachers involved (IC2). They were supported by a Grahamstown NGO (Umthathi) with their garden. Mhizana knew there was a lot of hard work that needed to be done in the garden and was hoping to bring in parents to help. However, she was worried that they would not do so without financial remuneration (I5a). The school did not submit their Eco-Schools portfolio for assessment in 2011.

Mhizana reported high unemployment and poverty amongst the community (SCP4). Learners reported cleanliness, need for greening, fixing of electric cables, fixing of dripping taps and lack of playground area as concerns in their school (PortMM-LU1)

7.2.5.2 Teacher and classroom context

Mhizana had 24 Grade 3 learners in her class. She had a Junior Primary Teaching Certificate, a Bachelor of Arts Degree, and had completed an Advanced Certificate in Education (Foundation Phase) and a Bachelor of Education (Honours). She had received training in the revised curriculum from the Department of Education. In 2009 she enrolled for a Masters in Education (Environmental Education) at Rhodes University and completed in 2011.

Mhizana's most commonly used teaching methods were practical classroom work and fieldwork and least used were "learner community research" and classroom experimentation (TCP4). She taught in Xhosa and translated posters with English text as she taught (OMM).

She used many different learning and teaching support materials to support her teaching: textbooks on personal issues, social issues, and health issues; flyers about nutrition; *Daily Dispatch* newspaper; and posters. She said that she engaged with the community by inviting health workers, parents, and agriculture officers to share information with learners (TCP4).

In response to discussion about her role as a teacher, Mhizana commented: "whether you like it or not we have [a role] to play especially under such conditions where our children look at us as parents – because you have to go out there and ensure that that child has eaten breakfast or whatever. Then you go to her home and check whether her parent is there and all that" (I5a).

Mhizana's interest in gardening was explained by her childhood experience: "My father bought a farm and we used to grow vegetables and all that ... Fortunately for me I grew up eating *imifino* [wild vegetables]. I want to expose my children. I would say that, then we were

lucky we were poor because we were exposed to so many things” (I5a). Before her teaching career began, she worked for the Department of Agriculture for ten years. She explained that she “was managing the small [agricultural] project. The Department was dealing with rural development. We had tractors and all that. Then the tractors were given to the communities and all that. So it was all about what I am doing now” (I5a). When she heard about the Schools and Sustainability Course she “had the idea of working outside. Also the idea of eating fresh vegetables like we do at home. So when I heard that there is this environmental challenge, I was so fortunate to be in that group” (I5a).

Mhizana felt that to be a good teacher “you must be passionate. You must also search for new knowledge ... you must go out there and find information. You must be able to plan in time to know what it is you are going to teach your children and what is it you need them to achieve. .. I think that you must love children ... I love children. Very much. I love what I am doing. I’m excited when I see them... grasping whatever... I also like to involve them in what I am doing just to listen to them and involve them” (I5a).

7.2.5.3 Teaching and learning activities

Mhizana’s lesson plans all focused on nutritious food and healthy eating and were linked to the school vegetable garden. The evidence below is reported from her portfolio.

Lesson Plan 1

Tasked through the first course assignment to design a lesson plan to help learners to find, use and present environmental information (Table 6.1), Mhizana focused her lesson plan on the Life Orientation learning outcome of making informed decisions in the context of identifying nutritious foods. It was integrated with data handling in Mathematics (see Table 7.12 below).

Table 7.12 Curriculum requirements selected for Mhizana’s first lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 1 (Grade 1): Identifies nutritious choices from a range of commonly available foods and drinks	Knowledge (Explicit): Nutritious food is important (Implicit): Difference between fruit and vegetables, role of different food groups in the body, importance of a balanced diet, problems with junk food, value of fresh, home-grown food Skills (Explicit): Makes informed decisions about food, makes choices Values (Explicit): Concern for personal, community and environmental health

Integrated Learning Area: Home Language	
LEARNING OUTCOME 5: THINKING AND REASONING The learner will be able to use language to think and reason, as well as to access, process and use information for learning ASSESSMENT STANDARD 2 (Grade 1): Classifies information	Knowledge (Implicit): Knowledge focus influenced by the main learning area – in this case, nutrition Skills (Explicit): Classifies information (e.g. into groups) Values (Implicit): Further, the curriculum should “expand possibilities in relation to both human rights and environmental justice” (South Africa. Department of Education, 2002d: 8)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: The teacher led a discussion about why people need to eat.
- Activity 2: The teacher told a story about a little girl who became very sick because of insufficient nutritious food. A clinic sister convinced her mother to start a community garden which succeeded in providing food for the child and others in the community. The child and her mother became advocates of healthy eating in the school and community.
- Activity 3: The teacher led a discussion of healthy food using a poster and was guided by questions in the poster (PLATE 18, Photograph 63).
- Activity 4: Learners drew food that should be eaten for breakfast, lunch and dinner (PLATE 18, Photograph 64).
- Activity 5: Learners completed a worksheet where they ticked what they like to eat and drink (PLATE 18, Photograph 65).

This lesson used a similar combination to Nomhle’s third lesson plan, except ‘thinking and reasoning’ was the main learning area and the Life Orientation interest in nutritious food provided the environmental knowledge focus of the lesson plan. The information dimension of active learning (the assessment requirement for Learning Unit 1) was developed in this lesson plan through activities focusing on why people need to eat (Activity 1), different food groups (Activity 3) and socio-economic complexities of food insecurity (developed through telling a story – Activity 2). Activity 3 and 2 represent a response to the Schools and Sustainability Course Learning Unit 1 emphasis on how to find, use and adapt information for use in the classroom (Section 6.2). The latter activity related to the implicit interest within the chosen Home Language curriculum requirements to “expand possibilities in relation to both human rights and environmental justice” (South Africa. Department of Education, 2002d: 8 –

Table 7.12). This curriculum intention was achieved through focusing on the learning outcome calling for learners to develop the capacity for ‘thinking and reasoning’.

Lesson Plan 2

For Learning Unit 2 teachers were tasked to develop a lesson plan supporting learners to work with important information, conduct enquiries and respond through direct or indirect action (Section 6.2 and Table 6.1). This lesson plan had the same Life Orientation focus (as Lesson Plan 1) of making informed decisions, and was supported by the same Home Language learning outcomes. A Social Science ‘historical enquiry’ learning outcome was also included which linked to the investigation of what learners’ parents used to eat in the past.

Table 7.13 Curriculum requirements selected for Mhizana’s second lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 1: Identifies nutritious choices from a range of commonly available foods and drinks	Knowledge (Explicit): Nutritious food is important (Implicit): Difference between fruit and vegetables, role of different food groups in the body, importance of a balanced diet, problems with junk food, value of fresh, home-grown food Skills (Explicit): Makes informed decisions about food, makes choices Values (Explicit): Concern for personal, community and environmental health
Integrated Learning Area: Home Language	
LEARNING OUTCOME 5: THINKING AND REASONING The learner will be able to use language to think and reason, as well as to access, process and use information for learning ASSESSMENT STANDARD 2 (Grade 1): Classifies information	Knowledge (Implicit): Knowledge focus influenced by main learning area (in this case nutritious food) Skills (Explicit): Classifies information (Implicit): The curriculum stated that language should be used to “read the world” critically considering issues such as “poverty, HIV/AIDS, the right to land, and consumerism” (South Africa. Department of Education, 2002d: 8) Values (Implicit): Further, the curriculum should “expand possibilities in relation to both human rights and environmental justice” (ibid.: 8)

Integrated Learning Area: Social Science – History	
HISTORICAL ENQUIRY The learner will be able to use enquiry skills to investigate the past and present ASSESSMENT STANDARD 1 (Grade 1): Answers simple questions about stories of the past ASSESSMENT STANDARD 2: Retells stories about the past ...	Knowledge (Implicit): Knowledge focus influenced by context (in this case, nutrition) Skills (Explicit): Enquiry skills, answer questions (Implicit): The curriculum described the process of historical enquiry as about “asking questions, finding information, and organising, analysing and synthesizing information” (South Africa. Department of Education, 2002h: 59) (Null): How to deal with qualitative and quantitative enquiries. Values (Implicit): The curriculum defined the role of Social Sciences to develop the “ability to become critically responsible citizens within a context where human and environmental rights are fostered” (South Africa. Department of Education, 2002h: 4) (Implicit): “Respect for and appreciation of all cultures and languages is integral to this Learning Area” (South Africa. Department of Education, 2002h: 6)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: This was a reflection activity about what children eat since the lesson alerting them to the need to eat healthy foods. A revision discussion was held about what we should eat for a balanced meal. The teacher introduced learners to different foods available including fruit and vegetables. A discussion led by questions from the textbook was also held. Questions from this discussion are listed below:
 - * *Why do we have to eat porridge in the morning?*
 - * *Do we have time to eat a meal during the day?*
 - * *Which is the most important meal?*
 - * *Why is it important?*
 - * *Do we eat meat every day?* (PortMM-LU2)
- Activity 2: The teacher introduced learners to food that their parents used to eat, narrating through story telling that home grown food is healthier than shop-bought food.
- Activity 3 assessment activity: The teacher asked learners to investigate past practices at home: What parents grew for eating, where they got food from, how healthy it was, and how it was planted. Learners compared findings and reported in groups (PLATE 18, Photograph 66).

The same Life Orientation focus on nutritious food was highlighted in this lesson plan. The information aspect of this lesson plan (a part-requirement of the Schools and Sustainability Learning Unit 2 assessment task) focused on revising what is needed for a balanced meal and discussing what should be eaten at different meals. The Learning Unit 2 requirement for an enquiry into a local issue or possibility, was realised in the form of a qualitative investigation into past food-related practices amongst parents and the broader community. This was linked to an integrated learning area – Social Science interest in ‘historical enquiry’ and the ability to ‘classify information’ was assessed (in response to Learning Unit 3’ requirement for teachers to develop and implement assessment tools) according to learners ability to ‘classify information’ (a Home Language assessment standard). The classification activity required learners to distinguish between food eaten in the past and food eaten in the present. The Learning Unit 2 requirement for a curriculum-related action activity was not evident in this lesson plan, but is evident in the following lesson plan which continued the same interest in nutrition.

Lesson Plan 3

The same Life Orientation focus was the main learning outcome, but Mhizana strengthened her Home Language activities for this lesson plan by focusing on thinking and reasoning in more depth and including the use of language to investigate and explore, offer explanations and solutions.

Table 7.14 Curriculum requirements selected for Mhizana’s third lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 1 (Grade 1): Identifies nutritious choices from a range of commonly available foods and drinks	Knowledge (Explicit): Nutritious food is important (Implicit): Difference between fruit and vegetables, role of different food groups in the body, importance of a balanced diet, problems with junk food, value of fresh, home-grown food Skills (Explicit): Makes informed decisions about food, makes choices Values (Explicit): Concern for personal, community and environmental health

Integrated Learning Area: Home Language	
LEARNING OUTCOME 5: THINKING AND REASONING: The learner will be able to use language to think and reason, as well as to access, process and use information for learning ASSESSMENT STANDARD 3 (Grade 1): Uses language to investigate and explore (asks questions and searches for explanations; offers explanations and solutions)	Knowledge (Implicit): Knowledge focus influenced by context (in this case, nutrition) Skills (Explicit): Investigate, explore, ask questions, offer explanations, offer solutions (Implicit): The curriculum stated that language should be used to “read the world” critically considering issues such as “poverty, HIV/AIDS, the right to land, and consumerism” (South Africa. Department of Education, 2002d: 8) Values (Implicit): Further, the curriculum should “expand possibilities in relation to both human rights and environmental justice” (ibid.: 8)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Learners worked in groups for a revision exercise finding nutritious foods in a poster and answering questions such as:
 - * *What is the importance of eating nutritious foods?*
 - * *If you do not have money would you be able to eat nutritious food?*
 - * *Where does food come from? (primary source?)*
 - * *Do you think we should plant indigenous plants here in the garden? (Why?)*
- Activity 2: In the school grounds, learners identified nutritious plants growing wild in the grounds. They mounted samples on a worksheet, labeled them and discussed how each was prepared for a meal (the parent who assisted in the school garden helped in the identification of wild vegetables) (PLATE 19, Photograph 67).
- Activity 3: The teacher explained the importance of eating well. She told learners that indigenous foods are rich in nutrients and, therefore, healthy to eat.
- Activity 4: Learners cut and pasted various nutritious foods to make a poster of food they would like to plant in their garden. The class discussed which could be added to the school garden including indigenous vegetables (learners were asked to bring plants the next day).
- Activity 5: Learners named and grouped the plants they had brought. The plants were labeled. Planting took place. Children took turns to water the plants (PLATE 19, Photograph 68).

The lesson plan started by emphasising important information (a Learning Unit 3 requirement), namely the value of eating nutritious food. As discussed above, this lesson plan strengthened the Home Language ‘thinking and reasoning’ of Lesson Plan 2. Learners

collected nutritious plants growing wild in the school grounds and investigated ways of cooking these through talking to knowledgeable community members (thus illustrating a response to the Learning Unit 2 support for teachers to develop enquiry tools (Section 6.2) – in this case a qualitative plant audit). They then addressed Home Language curriculum requirements by naming, grouping, planting and labelling wild vegetables on a worksheet and in their garden (an action responding to a further Learning Unit 3 requirement). These activities helped to develop learners' capacity to use 'language to investigate and explore'. There was no evidence of formal assessment of learners' work in this lesson plan (a final requirement for Learning Unit 3), but the assessment activity described in Lesson Plan 2 (reporting on food eaten in the past) was foundational to this lesson plan.

MHIZANA: PLATES 17 – 19

PLATE 17



Photograph 59: Indigenous tree planted at Mhizana's school



Photograph 60: Mhizana in the school vegetable garden



Photograph 61: Mhizana harvesting from the school vegetable garden



Photograph 62: Herb garden started at Mhizana's school



2. Which kinds of foods should you be eating more of? Why?
 3. Which foods should you be eating less of? Why?
 4. Why do you think some people don't eat healthy food?
- Share your ideas with the rest of the class.

Photograph 63: Poster illustrating relative amounts of food types that constitute a balanced diet



Photograph 64: Learner's work illustrating what should be eaten in the morning (kwakusasa), afternoon (kwesemini) and in the evening (kwangokuhlwa)



Photograph 65: Learner's work where they were tasked to tick what they liked to eat

Scrubber observation group work
- 2008-09-08 imifuno

Omama babesitya	Thina sitya
imifino	Khabetshu
utyuthu	ispinatshi
imbikicane	letasi
umsobo	brocoli
ihlaba	khoflawa
umli bo wethanga	tomato
irhamu	its wele
khabetshi	netalpile
is binatshi	Carrots
amathanga	butternut
intyabi intyaboyi	
ipesika	
khoflawa	
sweet potato	

2008/09/08

Photograph 66: Record of group's findings about what parents ate in the past (babesitya) and what they eat now (thina sitya)

PLATE 19



Photograph 67: A parent helps to identify different types of wild vegetables found in the garden



Photograph 69: Parent helps to plant indigenous vegetables



Photograph 68: Wild vegetables labelled and planted in the garden

7.2.5.4 Active learning process

This description of the active learning process discusses Mhizana's environmental learning activities across her three lesson plans with additional data from her portfolio (PortMM-LU1 – LU3), interviews (5a and 5b) and observations (OMM1). The description covers three key dimensions of active learning as identified in this study, namely situated learning, action orientation, deliberation and co-engagement. Each of these is discussed below.

Situated learning

In another case of adding 'reality, relevance and practical experience' as described above (Section 7.2.4), Mhizana's lesson planning was situated in relation to health challenges in the community, particularly a concern about a limited variety of vegetables provided in the homes. This is implied by her comments that "the menu that parents provide for children at home [needs to be] changed by informing them that they can use broccoli, parsley ... they need to change their menu" (I5a).

She also had a concern about learners' awareness of healthy food as evidenced in her comment that "learners like to eat sweets, cakes, chips, ice cream. They believe when they eat such food they are full. Fruit and vegetable are not part of their daily eating. Water and milk are less important to them" (PortMM-LU3). Learners did a worksheet on what they like to eat and from this Mhizana saw that learners liked a wide variety of 'healthy' and 'unhealthy' food (MMLU1). She hoped that learners would tell their parents about the importance of eating healthy food: buying brown bread, buying milk rather than fizzy drinks, drinking a lot of water, and exercising by working in the garden (Portfolio extracts).

Another element of the relationship between everyday and abstract knowledge as discussed in previous sections is a focus on cultural practices of the local community. In Section 3.3.2 this was described as a foregrounding of situated culture. Mhizana situated the use of traditional vegetables in relation to alternative sources of nutrition (PortMM-LU3). She commented that in lesson plan 2 "we made that comparison – that the spinach has the same nutrients as *umshlaba* [a wild spinach-type plant] so the idea of going to the garden was to find now this *umshlaba* – and they did get the *amashlaba* [plural] and all that from the garden. Even if we don't have a spinach, we can also use *umshlaba*. It was found in this garden" (I5a).

As an activity to help plan what to plant in the garden, learners investigated food they ate at home and food their parents ate in the past (PortMM - LU2). Learners were given two questions to ask:

- * *What was eaten in the past?*
- * *Where did they get it?*

Mhizana reported that "learners managed to do activities with enthusiasm, curiosity and flexibility, go out and interview parents on their own, write down food their parents ate, [and] compare and sort data – olden day versus now" (PortMM-LU2). She added that some children asked extra questions of their parents which they reported as well:

- * *How often did their parents eat each day?*
- * *Where did they grow their food?*
- * *How did they grow it?*
- * *If they were working so hard in the garden when did they get time to read a book?*

They brought some vegetables from home and looked at others already in the garden. In addition visiting parents toured the garden with learners showing them different types of wild vegetables and sharing different recipes for these (PortMM - LU2).

Action orientation

The situated learning described above influenced the addition of wild vegetables in the school food garden. The school had started a food garden and a herb garden after joining Eco-Schools and the Schools and Sustainability Course in 2008. The vegetable garden included plots for each class. There was evidence of intercropping in the garden which was influenced by an EduPlant permaculture programme with which the school had previously been involved (OMM1). In the year of the course Mhizana commented that "our garden was viable. All the seedlings were growing gradually and learners could see the results" (PortMM – LU1). It depended on children helping in the garden every afternoon with activities such as hoeing or planting seedlings (PortMM-LU1). Mhizana mentioned that they were able to sell vegetables from their garden and to cook for children so that they were able to eat vegetable soup twice a week with their feeding scheme bread instead of simply butter (PortMM-LU3).

The involvement of the community contributed to the success of the garden as well as was evident from the support the community gave by providing fertilizer (OMM1) and their participation in work such as hoeing (Portfolio extracts). However, already in 2008 Mhizana was concerned that "some parents who assist in the garden expect to have veggies [vegetables] every time they work in the garden or to be paid" (PortMM-LU3).

Mhizana was particularly successful in increasing the variety of vegetables in the school garden in her activity where wild vegetables were brought from homes and planted in the garden (I5a) (PLATE 19, Photograph 69).

When I visited the school in 2009, Mhizana lamented delays in receiving the school budget. She said “we have managed to get some guys here from my own pocket because I want to sustain it”. However, the garden was still successful with learners watering it each day and working in the garden each Friday for an hour at the end of school (I5a). The school was still getting support from WESSA which provided seedlings for the garden.

Another interest raised regarding action learning is whether learners are able to exercise their voices beyond the classroom (Section 7.2.2.4). At the beginning of the course Mhizana wondered about whether “whether learners will practise to buy healthy food or help their parents when doing groceries or making food – breakfast, lunch, supper” (MMLU1: pg.27). She also commented on this statement during an interview adding that “as much as I am teaching this nutritious food in my classroom, so the parents need to change their menu. If children inform them [parents] about these changes, they are going to change their minds. Can they do that? Hopefully”? (I5a). From her comments later in her portfolio it appeared that she was confident of her learners’ ownership of the ideas they had discussed in the classroom as well as the effect of their successes in the community: “all my learners are keen about what they know. They teach others ... comments such as ‘Do not eat too much sweets, drink lots of water’ are order of the day” (PortMM-LU3) and “Grade 1 learners are conscious of what they eat – less sweets, more fruit and vegetables” (PortMM-LU2) and “I have many children in my school who are now advocates of healthy eating, growing vegetables, sustaining our garden by taking care of it. The surrounding schools have come and ask how did we manage to have a school garden. Some are observing what we do after school. Three gardens have been started in our community inspired by us” (PortMM-LU3).

Mhizana saw a change in the learners’ attitude in that they started to see traditional foods as not outdated, but nutritious (PortMM-LU2). Also the fact that learners asked her if they could plant wild vegetables, herbs, sweet potato and bitter melons in their garden (PortMM-LU2), illustrates an interest in traditional foods. However, she reported that some learners had never seen or eaten bitter melons before. She lamented that these kinds of food from the past were only told about but were not available for learners to see or plant (PortMM-LU2).

This lesson plan had the advantage of increasing learners’ respect for their parents (PortMM-LU2) and parents showed a greater interest in their children’s learning as was evidenced in their coming to school to share their knowledge (PortMM-LU2). Also Mhizana reported that “Learners feel empowered when they carry out instructions on their own (interview, reporting, reviewing)” (PortMM-LU2).

Deliberation and co-engagement

This section discusses the scientific and value-based engagements with the environment and sustainability concepts raised during the situated and action activities described above.

The following list summarises the foundational scientific knowledge signified by the topics Mhizana introduced to her learners over the three lesson plans, as well as an explanation of the methods she used with each new topic or concept. This knowledge is grouped in four categories: a) Definitions and concepts, b) Historical practices, c) Nature and causes of issues, and d) Problem-solving or 'how to' knowledge.

a) Definitions and concepts regarding nutrition

- Different types of cultivated vegetables and fruit: Teacher used a poster.
- Identifying food groups and their value: Learners made posters categorising food groups and were able to list in class (OMM1). Mhizana commented: “they were able to differentiate fruit, vegetable, dairy, starch” (PortMM-LU1) and say which food provides which benefit (PortMM-LU2).
- Distinguishing healthy from unhealthy: Comparison of ‘most healthy’ between white and brown bread, sweets and fruit; etcetera. Learners made a choice in classroom discussion (OMM1).
- Balanced meal: Relative amounts that should be eaten of different food types (balanced meals): Learners demonstrated knowledge when they made a poster of foods to be eaten for breakfast, lunch and dinner.

b) Historical practices

- What people ate in the past: The teacher told learners about *umqusho* [a stiff porridge made from maize], how it was ground, its value as a starch, how we now eat different types of starch, how home-grown food is healthier than shop-bought food (OMM1), and the nutritional value of wild vegetables. Learners also gathered information in the community and reported back in class.

c) Nature and causes of an unbalanced diet

- The important of eating healthy food (thereby knowledge of the nature of the issue of malnutrition): The teacher explained that we eat healthy food for: good skin and teeth; to fight germs, to grow, to be strong (translation from teacher notes) (PortMM - LU1). Learners did a worksheet where they chose foods that:
 - * *Protect the body from disease*
 - * *Give us strength* (PortMM-LU2)

- Socio-economic complexities of nutrition: The teacher illustrated this through a story. Learners consolidated the information by drawing a picture of how they understood the story (PortMM-LU1). Class discussion was held as to why some people don't eat healthy food (PortMM-LU2). Learners participated in a listening exercise which described how learners miss the lunchtime meal with parents at work (PortMM-LU2). The questions posed in lesson plan 2 opened up questions about why people do or do not eat a balanced diet.
- d) Problem-solving or 'how to' knowledge
- Different types of *imfino* and recipes for these: Parents collected wild vegetables during a walk about in the school and shared this knowledge, learners found out from home. Evidence of learning was shown when learners named four types of *imifino* in the classroom (OMM1). Learners planted and labeled wild vegetables in the garden.

Use of the above-mentioned scientific and social understandings for critical engagement with issues regarding nutrition is evident in Mhizana's questions to learners around the complexity of choices in diet:

- * *What foods should you be eating more of?*
- * *Which foods should you be eating less of?*
- * *Why do you think some people don't eat healthy food?* (PortMM-LU1)
- * *Why do we have to eat porridge in the morning?*
- * *Do we have time to eat a meal during the day?* (PortMM-LU2)

These questions had the potential to raise awareness amongst learners of shortcomings in their diet but at the same time acknowledge that even though some people know what food is healthy they still might not eat the right food. The reasons for this were explored in class.

7.2.6 Teacher 6: Zodwa

The data used to form this section comes from Zodwa's school and community profile (SCP11), teacher and classroom profile (TCP12), one school observation (OXN1), one interview (I6), the portfolio activities (PortXN LU1, LU2 and LU3), the portfolio lesson plans (LP1XN, LP2XN and LP3XN), and informal conversation (IC1). The sections that follow draw on this data to present a school and community profile, teacher and classroom profile, a description of activities and curriculum requirements selected for three lesson plans, and a description of the emergent active learning processes across all three lesson plans including links to school and community action projects.

7.2.6.1 School and community context

At the time of the study, Zodwa was working at a school (School 6 – Figure 1.2) (PLATE 20, Photograph 70) situated in a densely populated informal settlement on the edge of Mdantsane (PLATE 20, Photograph 71). The school offered Grade 1 to 7. Zodwa reported that only thirty percent of learners could afford school fees in a community with high unemployment, poverty, illiteracy and crime. Learners came to school with empty stomachs (some are said to vomit due to hunger or from eating unhealthy food). Some learners lived in child-headed households because parents had sought employment elsewhere. This was worsened by a high rate of illnesses such as HIV/AIDS in the community and amongst learners and orphans (SCP11). Difficult relationships between community and municipality were evident in Zodwa's explanation that "bringing the [water and electricity] municipal accounts was challenging because some learners said that their parents have burnt these accounts" (PortXN-LU2).

In 2008, at the start of the course, the school had a permaculture garden (including fruit, vegetables, herbs and flowers) watered partly by recycled water (OXN1). Permaculture techniques such as intercropping (PLATE 20, Photograph 72), submerging bottles with small holes to serve as drip irrigation, keyhole gardens which capture water runoff (PLATE 20, Photograph 73), and banana circles (PLATE 21, Photograph 74) were evident in this flourishing garden.

In 2008 the school also had a solid waste management and recycling system with the support of the municipality (OXN1). Learners helped to collect and sort rubbish for recycling. This was collected by the municipality (PLATE 20, Photographs 75 and 76).

In 2005 and 2006 the school received Eco-School awards. The school continued to participate in activities to support Eco-Schools run by WESSA, but up until 2011 had not re-registered. In 2008 the School Governing Body participated in an environmental committee and permaculture and waste management projects, and the principal supported these projects as well (OXN1). Zodwa reported that "we generated about R400-R500 income from selling waste – plastic bottles and cans. We received five waste recycling bins from Solid Waste Management" (PortXN - LU3). However, Zodwa lost the support of both the governing body and the principal to the point that she withdrew entirely from Eco-Schools, and in a 2011 visit, the garden was neglected and water management systems had ceased (although due to the nature of permaculture design, it still was producing significant amounts of fruit and herbs) (PLATE 21: Photographs 77 and 78) (I6).

In 2008 the school was struggling with sanitation (blocked toilets and broken hand basins) (PLATE 22, Photograph 79), as well as leaking taps and pipes (PLATE 22, Photograph 80) and blocked drains (PLATE 22, Photograph 81); with subsequent air pollution (a foul smell). Zodwa explained that development builders had used very cheap material with small water pipes (RW2). These problems had been exacerbated by vandalism and stolen pipes which affected “learners and educator's health because the learners are released to go at 11h30 due to lack of proper sanitation, having no water in the loos and for drinking and health rules like washing hands” (PortXN-LU2).

7.2.6.2 Teacher and classroom context

Zodwa taught in an overcrowded classroom of 60 or more Grade 3 learners at a time. She had a Junior Primary Teachers Diploma; a Further Diploma in Remedial Education; and a Bachelor of Education (Honours) in Education, Training and Community Development. Zodwa had participated in many professional development activities including Department of Education curriculum courses, a permaculture design course run by Food and Trees for Africa, the NEEP-GET, and the Rhodes University Gold Fields Participatory Course in Environmental Education (TCP12). In 2011, a telephonic conversation with Zodwa revealed that she was not able to register for an Advanced Certificate in Education (Environmental Education) at Rhodes University (she had filled in an application but had had second thoughts) as she felt that she would not get the support of her principal to do the school-based tasks (IC1).

Zodwa's most often used teaching methods were “learner community research” and fieldwork. Her least commonly used methods were learners copying work from the board and learners researching their own information. Learning and teaching support materials which she used for environmental learning were a textbook for information on waste management; Department of Water Affairs and Forestry guides on water; and posters on waste, water and littering (TCP12). She taught in Xhosa and developed her own worksheets in Xhosa.

7.2.6.3 Teaching and learning activities

Zodwa's lesson plans focused on water use and recycling and were linked to water waste and water saving techniques which contributed to the permaculture garden. The evidence below is reported from Zodwa's portfolio.

Lesson Plan 1

This lesson plan used Life Orientation’s recycling learning outcome which appears to link to the aspect of the lesson plan that focused on water re-use. Integration with Social Science (Geography) investigative skills links to the investigation of water hot spots in this lesson plan. Table 7.15 below lists the curriculum requirements selected for this lesson plan.

Table 7.15 Curriculum requirements selected for Zodwa’s first lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 2 (Grade 3): Participates in a recycling project and explains how recycling contributes to environmental health	Knowledge (Explicit): Link between recycling and environmental health. (Implicit): How waste contributes to environmental degradation (soil, air and water pollution, and biodiversity loss) at all levels of life cycle of waste products; and how these impact on the health of living organisms Skills (Explicit): Informed decisions, recycling. (Null): The systemic complexities of setting up a recycling system Values (Implicit): Concern for personal, community and environmental health (Null): Assumption that recycling is good
Integrated Learning Area: Social Science (Geography)	
LEARNING OUTCOME 3: EXPLORING ISSUES: The learner will be able to make informed decisions about social and environmental issues and problems (e.g. wasting water, energy or physical resources; safe disposal of refuse or chemicals) [the issues] ASSESSMENT STANDARD 1 (Grade 3): Identifies one or more pollution issues in a particular context AS2: Makes informed decisions about social and environmental issues and problems	Knowledge (Explicit): List of some ‘issues’ (Implicit): Generic information about what makes the listed types of pollution ‘issues’ Skills (Explicit): Informed decisions (Implicit): In the introductory chapter the curriculum suggests an enquiry process that involves identifying, understanding and making choices regarding an issue (South Africa. Department of Education, 2002h: 49) and that learners “use a range of methods in the accurate presentation of information – in graphic and tabular format, and by using a variety of maps, photographs and images” (ibid.: 70) Values (Explicit): Pollution is a problem. (Implicit): The curriculum states that Geography should foster “an informed concern for the world around us and an ability and willingness to participate in actions for a sustainable environment” (South Africa. Department of Education, 2002h: 5)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Learners walked around the school and drew water waste problems

(PLATE 22, Photograph 82). This activity was supported by a poster showing water waste activities and water hazards (PLATE 22, Photograph 84).

- Activity 2: The teacher took learners out for a field trip to the schoolyard. She showed the learners how water was conserved in the pond, key holes, in swales, and through mulching.
- Activity 3: In groups, learners investigated water waste hot spots in the school yard (including description of problems, quantification of problems, and description of causes). Then they discussed implications for health and human rights. Groups communicated their findings in class and then reported on a group presentation sheet designed by Zodwa (PLATE 23, Photograph 83).
- Activity 4: Learners signed a pledge (extracted from a textbook) to conserve water and biodiversity (PLATE 23, Photograph 85), which Zodwa translated as follows:

This vow is a 'promise to respect water and biodiversity, they will use water wisely, they will not pollute rivers and they will help in solving water related issues' (PortXN-LU1)

- Activity 5: Groups read extracts from a textbook about how to conserve water. The text has been translated as follows:
 - * *We must protect water all the time*
 - * *We must use water and not waste it*
 - * *We must not dirty the dams with rubbish*
 - * *We must make a stand to solve water problems*
 - * *We must protect water so the Earth can be healthy*
 - * *We must recycle water*
 - * *We must fix leaking taps and other things that leak*
 - * *We must reduce the amount of water that we use*
- The group discussed the knowledge they gained from the reading and designed a water policy which was reported to the class (PLATE 24, Photograph 86). The policy can be translated as follows:
 - * *You must wash hands in a bucket*
 - * *You must water trees with water used for washing dishes*
 - * *You must close the tap even if it is not you who opened it*
 - * *Collect water from leaking taps with a bucket*
 - * *If a child is playing with water, you must tell the teacher or one of the mothers [those that cook food for the feeding scheme].*
 - * *Make a furrow to take water into a pond*
- Activity 6: Individually, learners wrote sentences about how they could save water (PLATE 24, Photograph 87). The learner's work in this photograph can be translated as follows:

1. *Collect leaking water in a bucket*
2. *Use plastic bottles to make watering can*
3. *Put mulch around the plants*
4. *Make a furrow to divert water into a pond*
5. *When it is raining collect water in a tank*

This lesson plan presents activities focusing on information and enquiry (finding out from a poster about ways to waste water, how to save water from a schoolyard investigation in the permaculture garden, and how to save water from a textbook extract) and indirect action (developing a policy for saving water in the school yard). These activities responded to the Learning Unit 1 interest in finding and using materials relevant to context and the Learning Unit 2 interest in enquiry – in this case a qualitative enquiry of water saving practices in the school. The enquiry addressed the Social Science interest in identifying issues in context and the actions (designing a water saving policy for the school) addressed the same learning area well as Life Orientation’s interest in making informed decisions about issues and problems. Even though the link to ‘recycling’ in Life Orientation was not very clear, the link was possibly made because water wasted from dripping taps was diverted into the permaculture garden.

Lesson Plan 2

For Learning Unit 2 teachers were tasked to develop a lesson plan supporting learners to work with important information, conduct enquiries and respond through direct or indirect action (Section 6.2 and Table 6.1). Zodwa again used the Life Orientation learning outcome of making informed decisions with a different assessment standard and integrated this with a Mathematics measurement learning outcome (learners measured water loss) and a Social Science enquiry-based learning outcomes. Table 7.16 below lists the curriculum requirements selected for this lesson plan.

Table 7.16 Curriculum requirements selected for Zodwa’s second lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 4 (Grade 3): Identifies relevant people and their contact details to report cases of accidents, abuse, crime, illness and injury	Knowledge (Implicit): Knowledge of rights in order to identify cases worth reporting Skills (Explicit): Confidence of right to “have a voice”; reporting cases of abuse Values (Implicit): Valuing learner participation in democratic society; concern for personal, community and environmental health

Integrated Learning Area: Mathematics	
LEARNING OUTCOME 4: MEASUREMENT: The learner is able to use appropriate measuring units, instrument and formulae in a variety of contexts ASSESSMENT STANDARD 5 (Grade 3): Estimates, measures, compares, and orders three dimensional objects using non-standard and standard measures	Knowledge (Explicit): Measuring units Skills (Explicit): Estimate, use measuring instruments, orders three dimensional objects Values N/A

Integrated Learning Area: Social Science (Geography)	
LEARNING OUTCOME 1: GEOGRAPHICAL ENQUIRY: The learner is able to use enquiry skills to investigate geographical and environmental concepts and processes ASSESSMENT STANDARD 3 (Grade 3): Answers questions about key features of people, places, resources and changes in the environment	Knowledge (Explicit): Geographical concepts and processes (Implicit): The Social Science curriculum specifies change in the environment in its 'knowledge focus' section as change in "buildings, roads, houses and other infrastructure ..." (South Africa. Department of Education, 2002h: 24). In this case the focus was on water infrastructure. Skills (Explicit): Investigation Values (Implicit): The curriculum states that Geography should foster "an informed concern for the world around us and an ability and willingness to participate in actions for a sustainable environment" (South Africa. Department of Education, 2002h: 5)

Activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: Learners read measurements on waste products they collected (for example 2 litre Coke bottle, 330 ml can of Sprite). Over four days learners collected and measured water lost from leaking taps (PLATE 24, Photograph 88). Assessment Task: The learners drew a bar graph showing daily water loss from the taps (PLATE 24, Photograph 89). They compared the daily measurements and discussed reasons for the differences (PLATE 25, Photograph 90).
- Activity 3: Learners wrote placards as an awareness campaign to be distributed to the entire school (one placard for each of 17 classrooms) (PLATE 25, Photograph 91).
- Activity 4: In groups learners interviewed educators and members of the school governing body about what caused water waste in the school and in the community. Learners wrote letters to the principal and school governing body, and ward councilor about these problems (PLATE 25, Photograph 92). Before this they brainstormed

who to write to and what assistance to ask for.

In an enquiry activity learners interviewed relevant people about the water problems in their school and discussed who they should write to in order to report their findings. This linked to the Life Orientation learning outcome of making informed decisions focused on identifying relevant people to report cases of accidents, abuse, crime, illness and injury (in this case it seems as if the teacher chose to interpret ‘abuse, crime and illness’ in the sense of abuse of water resources, vandalism and theft and the potential implications for human health with an inadequate water supply in the school). The enquiry also linked to a Social Science ‘enquiry’ learning outcome. Integration with a Mathematics ‘measurement’ learning outcome (learners measured water loss) influenced an audit of water-related issues in the school. These two audits illustrate the Learning Unit 2 support for teachers to develop qualitative (the interview of relevant stakeholders) and quantitative (measurement of water loss) enquiry tools. The enquiry was followed by two indirect action activities, namely making of placards and writing letters to relevant people identified (in this way, further addressing Learning Unit 2 assessment requirements).

Lesson Plan 3

In this lesson plan, Zodwa appears to have linked model-making to recycling in Life Orientation and geographical knowledge and understanding (people and resources) to the activities exploring water in the community now and in the past. Measuring and comparing water bills between different homes was linked to data handling in Mathematics. Table 7.17 below lists the curriculum requirements selected for this lesson plan.

Table 7.17 Curriculum requirements selected for Zodwa’s third lesson plan

Main Learning Area: Life Orientation	
LEARNING OUTCOME 1: HEALTH PROMOTION: The learner will be able to make informed decisions regarding personal, community and environmental health ASSESSMENT STANDARD 2 (Grade 3): Participates in a recycling project and explains how recycling contributes to environmental health	Knowledge (Explicit): Link between recycling and environmental health. (Implicit): How waste contributes to environmental degradation (soil, air and water pollution, and biodiversity loss) at all levels of life cycle of waste products; and how these impact on the health of living organisms Skills (Explicit): Informed decisions, recycling. (Null): The systemic complexities of setting up a recycling system Values (Implicit): Concern for personal, community

	and environmental health (Null): Assumption that recycling is good
Integrated Learning Area: Social Science (Geography)	
LEARNING OUTCOME 2: GEOGRAPHICAL KNOWLEDGE AND UNDERSTANDING: The learner will be able to demonstrate geographical and environmental knowledge and understanding ASSESSMENT STANDARD 2 (Grade 2): Identifies some resources that are available and are used in the local area (e.g. water, minerals), and explains where they come from [people and resources]	Knowledge (Explicit): Sources of water Skills (Explicit): Enquiry into local sources Values (Implicit): The curriculum states that Geography should foster “an informed concern for the world around us and an ability and willingness to participate in actions for a sustainable environment” (South Africa. Department of Education, 2002h: 5)
Integrated Learning Area: Mathematics	
LEARNING OUTCOME 5: DATA HANDLING The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation ASSESSMENT STANDARD 1 (Grade 3): Collects data alone and/or as part of a group or team in the classroom and school environment to answer questions posed by the teacher and class	Knowledge (Implicit): Knowledge focus influenced by main learning area (in this case, recycling) Skills (Explicit): Collects data and answers questions Values (Implicit): The Mathematics curriculum sees Mathematics as enabling learners to “contribute responsibly to the reconstruction and development of society by using mathematical tools to expose inequality and assess environmental problems and risks” (South Africa. Department of Education, 2002f: 5)

The activities conducted to implement these curriculum objectives are briefly described below:

- Activity 1: The teacher read a story about a 10 year old boy called Zondi who lived in a village where environmental problems abounded because of a shortage of rain and people's activities (veld fires, deforestation, digging soil to build houses). Livestock had insufficient water and families had limited water and had to buy from the local shopkeeper. Zondi told his friends about water saving techniques. They followed his ideas and got water for washing bodies, clothes, homes and irrigating fruit trees. Learners answered questions about the story.
- Activity 2: Learners read information about where water comes from, how it is treated and the dangers of water. A class discussion was held about what they had learned. Learners used English words to label a picture about where water comes from (PLATE 26, Photograph 94).

- Activity 3: Learners brought old municipality accounts from home. Groups compared the amount paid in a household in different months (PLATE 26, Photograph 95). This was done as a subtraction sum. Learners discussed why there were differences. The reason given (by the learner whose work is represented in this photograph) for more water used in a later month can be translated as “The pump was leaking and later fixed” (The date of the first reading ‘2008’ in the learner’s work is confusing but should read 2007).
- Activity 4: Learners interviewed parents about how water was collected and stored in the past and this was communicated orally in class.
- Activity 5: Learners wrote four sentences describing water in their community (PLATE 26, Photograph 96).
- Activity 6: In groups, learners made a water source model using materials from home (PLATE 26, Photograph 97).
- Activity 7 assessment activity: Learners recited a poem about water and discussed water conservation methods in home, school and community. This was summarised on the chalkboard. Learners wrote their own poems for assessment purposes (PLATE 27, Photograph 98). This poem has been translated as follows:

*Save water at home, school and community
At home we use a glass when we brush our teeth
We can use water we have used for cleaning the floor in the garden
When it is raining we get buckets and drums and bowls*

*At school we put mulch around the plants
We catch the rain in a tank
They make 'imisele' [swales] with pond
You must drink water with a glass not your mouth so that you do not catch disease.*

*In the community do not pour food in the drains
Don't leave taps open
Don't pour food in the sink
Don't steal copper and sell it*

The activities in this lesson plan included information-based activities including listening to a case study of water use and water-saving in a rural context; reading information about water sources, water treatment and dangers of water; and historical information about past methods of water collection and storage; reading poetry about water, and discussing water saving in home, school and community. These all linked to a Social Science interest in knowledge and understanding (of natural resources). Activities also included enquiry into water usage in homes (based on municipal bills), thus partly meeting Learning Unit 3 assessment requirements to develop activities for helping learners to work with information and conduct a

local enquiry. The lesson plan also included an activity where learners built a model representing a water source. This activity may have been intended to meet a further requirement for Learning Unit 3 – an action; however, by Jensen and Schnack’s (1997: 165 – Section 3.3.2) definition of an action as “conscious, considered and targeted” at an environmental issue and by the requirement in the course assessment task for activities that respond (either directly or indirectly) with an environmental action to issues identified (Table 6.1), this activity would not be defined as an action. The Life Orientation interest in participating in a recycling project was assessed, thus meeting the Learning Unit 3 requirement of development assessment tools: The first assessment was of the water source model (Activity 6) and the second of the poem about saving water through ‘recycling’ wasted water (Activity 7).

ZODWA: PLATES 20 – 27 (Note that in the interests of anonymity, identifiable faces have been cropped from photographs or faces have been made fuzzy)

PLATE 20



Photograph 70: The façade of the school



Photograph 72: Vegetable garden using the permaculture intercropping technique



Photograph 71: A view of the informal settlement from Zodwa's school



Photograph 73: Keyhole beds to collect water runoff

PLATE 21



Photograph 74: Banana circle



Photograph 75: Learners help to manage to recycling system



Photograph 76: Plastic sorted ready to be collected for recycling



Photograph 77: Indigenous hedge planted on the border of the school



Photograph 78: Comfrey in overgrown herb garden



Photograph 79: Broken and blocked toilets



Photograph 80: Leaking taps



Photograph 81: Teacher points out blocked drain during audit of water waste hot spots

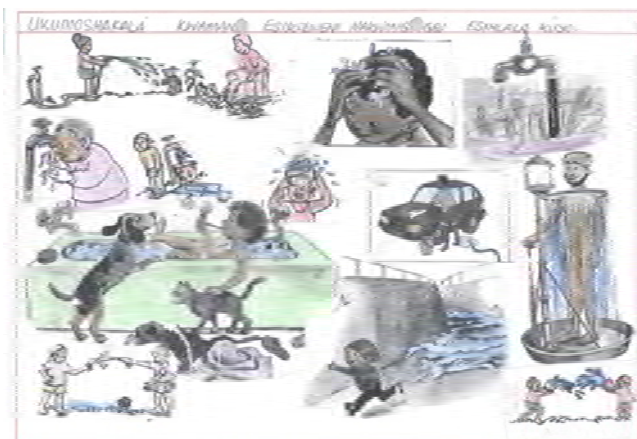


Photograph 82: Learner drawing of leaking taps in school

GROUP PRESENTATION SHEET

1. We have identified water wastage hot spots in the / at school
behind the office, near the toilets and kitchen.
2. We think the cause/s of the problem/s is/are
leakage from taps
pipes are broken
do not close the taps.
taps are not repaired.
3. This / These problem/s will have the following effect /s
We have no water to flush toilets and drinking.
We go home early.
The toilets are blocked.
4. We suggest that the following action / s can solve the problem/s
write a letter to the principal and SGB
and to the R.C. Municipality to repair taps and pipes.

Photograph 83: Learner group presentation sheet for their enquiry into water waste hot spots in the school



Umsebenzi 3

Ukumamela

Vala isikhewu uze uzibophelele kwesi sibhambathiso sokulondoloza amanzi.

Mna Linako Mayo ndithembisa ukuba ndiyakuwahlonipha amanzi nezinye izinto zendalo. Ndakuwasebenzisa ndiwagcine kakuhle amanzi. Andiyi kuyingcolisa imilambo ngeesepha nangezinye izinto ezimdaka.

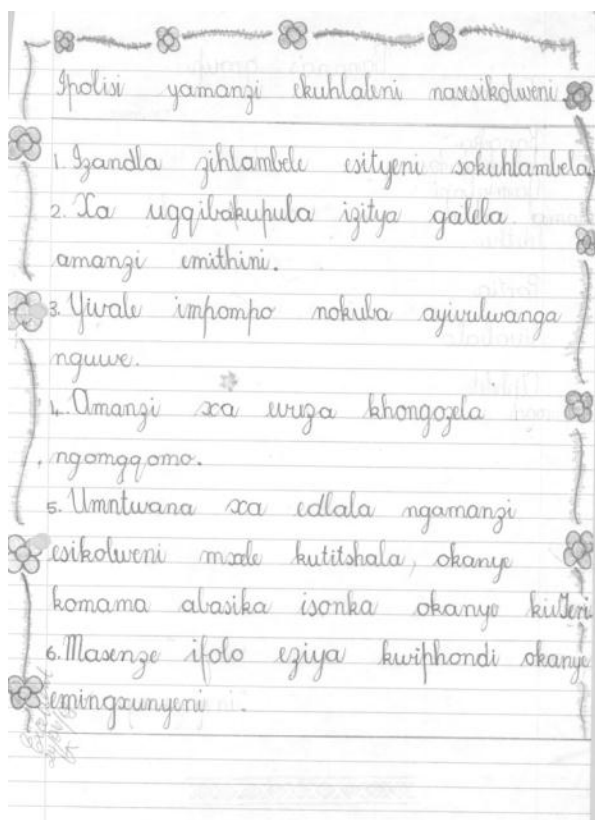
Ndiyakuncedisa ekusombululeni iingxaki zamanzi.

108 Igama —

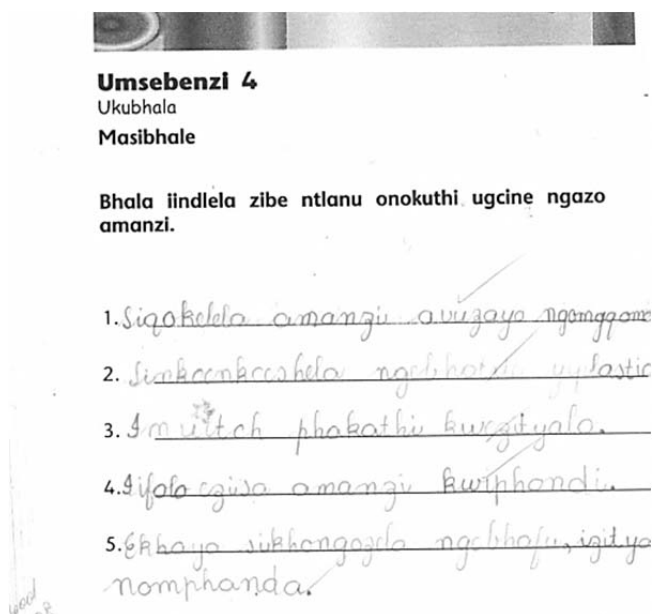
Sayina mfundi

Photograph 85: Pledge signed by learners to conserve water

Photograph 84: Poster used to show water waste and water hazards



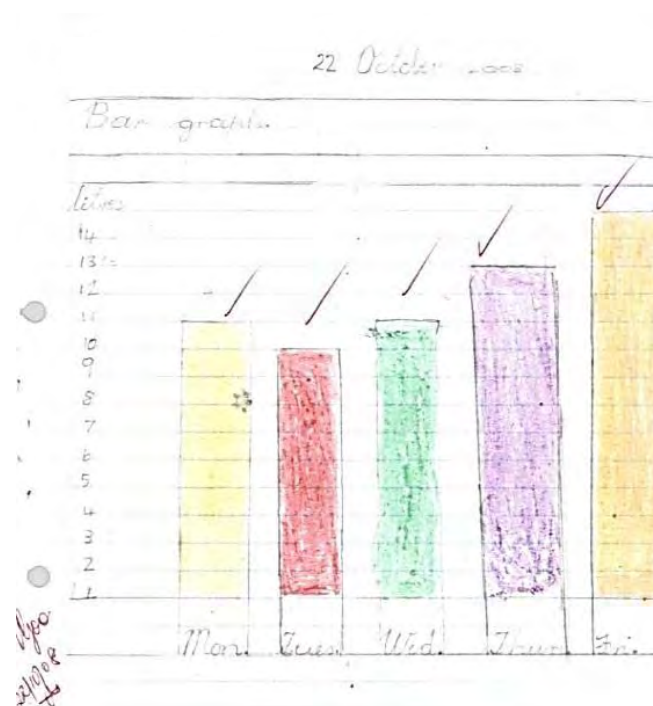
Photograph 86: School water policy designed by learners



Photograph 87: Sentences written by a learner about how to save water – prompted by worksheet from a textbook



Photograph 88: Learner collecting water from a leaking tap to be measured and recorded



Photograph 89: Bar graph showing water loss in litres from Monday to Friday

22 October 2008

Water Wasted on leaking taps and
pipes in the school yard.

1. Loluphi usuku amoshakele kakhulu amanzi?
Lwesithle.

2. Kuba kutheni?
Sasibikele ukubeka amaphesheya.

3. Loluphi usuku enimejele amanzi
amaningazi?
Lwesithle.

4. Kuba kutheni?
Sasibikele amaphesheya sisemela
amaningazi amaningazi angavuzeli
phantu.

5. Intoni ebangela ukuba kuvuze
amanzi kangaka yonke imihla?
Imibhobho imoshakele ayide
kungiswe.

Photograph 90: Learner's work discussing the water loss measured in the graph



Photograph 91: Learners show placards promoting water-saving in the school

Ngomhlabano Public School
P.O. Box 4041
Duncan Village
5219
20 KweyeDwarha 2008

Nqumunni nesigqeba esilawula isikolweni
Singabafundi lbakala 3 sinengqaki
yokumoshakala kwamanzi, nokungabikhe
kwawo ngqinye imini, esikolweni sibhu.
Umoya esubaphumlayo nyanuka
ngentona yezindlu zokugasela amakhwenk
u, izinomkhomo ophumela ngaphandle.

1. Sicela amatanki okukhongozela amanzi
emnyala amoshakalayo.
2. Sicela kungiswe imibhobho neempompo
ezivuze amanzi.
3. Sicela kuthengwe iziciko zokuvula isinki.

Ubantwana benu
lbakala 3

Photograph 92: Letter written by a learner to the school principal and school governing body

Councillor M. Dinizulu
Ward 6
1st Floor, City Floor, Oxford Street
EAST LONDON
5200
Cell No: 073 2856 070

23 October 2008

Dear Bafundi

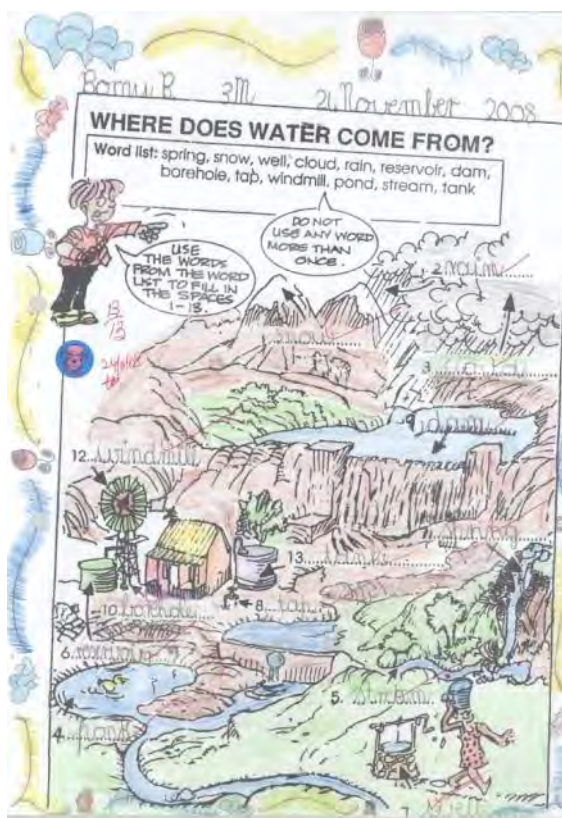
Ndiyabulela ukufumana imibalelwano evela
kuni. Kuyandivutisa ukufumana uluvo
lwenu ngezinto eziqhubekayo ekulaleni.
Ndiyathembisa ukuba izinto eniziphaka
musileyo ziyokulandelwa ngamagosa
kamasipala ngethuba elikhawulezileyo.

MAYENZEKE DINIZULU
COMMISSIONER OF DOMESTIC OFFICE
COUNCILLOR
BUFFALO CITY MUNICIPALITY CITY HALL
OXFORD STREET, EAST LONDON
5200
SEP 19/08 10:00 AM AT/CCA

Ozithobileyo
M. Dinizulu
NB

BUFFALO CITY MUNICIPALITY
2008-10-23

Photograph 93: Reply from the ward councillor



Photograph 94: Learners fill in words on a poster about sources of water

Municipality account 21 October 2008

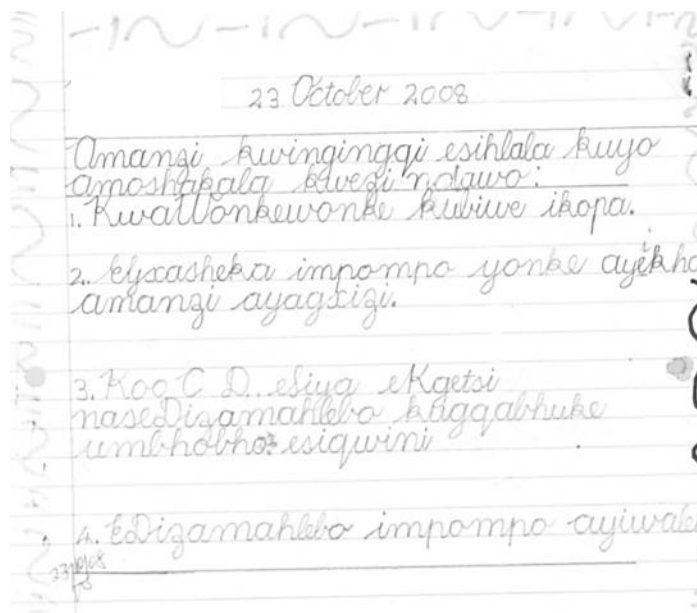
Surname	Date	Amount Paid	No. of people
Lamaki P.	21.04.2008	R 315,96	4
	21.06.2007	336,34	4
		5 12	
		R 336,34	
		-R 315,96	
		20 38	

Kusenzi indawulo yamanzi
ingafani nye?

Umdlompompo abizwa abungisiwe ✓

Gude L. Grade 3 G

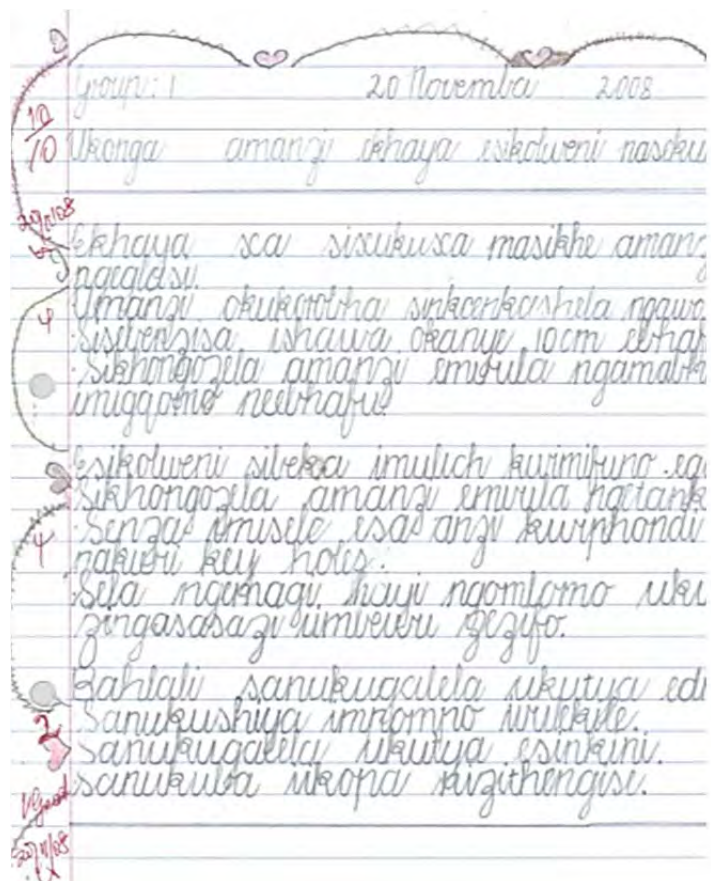
Photograph 95: A learner calculates the difference between municipal accounts of two households and discusses the difference



Photograph 96: Learner's work describing water in the community in four sentences



Photograph 97: Windmill made by learners to represent a source of water



Photograph 98: Poem written by a learner about how to conserve water

7.2.6.4 Active learning process

This description of the active learning process discusses Zodwa's environmental learning activities across her three lesson plans, with additional data from her portfolio (PortXN-LU1 – LU3), interviews (I6) and observations (OXN1). The description covers three key dimensions of active learning as identified in this study, namely situated learning, action orientation, deliberation and co-engagement. Each of these is discussed below.

Situated learning

In the following paragraphs, evidence is presented of a number of scientific and social science enquiry activities where learning was situated in relation to investigations of learners' own context at school, in the community and at home. Learners walked around the school looking at water waste hot spots in the school and also drew pictures of particular scenarios. They counted leaking taps and pipes, explained why they were leaking and what caused the leakages. They counted sinks that needed repair and described what kind of repair was needed. They counted blocked drains and discussed the causes of the blockages. They identified stagnant water and described associated smells. Then they discussed implications for health and rights (PortXN-LU2). In a following enquiry activity, learners interviewed educators and school governing body members. Learners also measured water lost from taps over four days. In response to water wastage at school, Zodwa taught her learners how the (already established) permaculture garden was making effective use of water waste through initiatives such as a pond, key holes, and swales to collect water run-off and mulch to reduce evaporation from the roots of plants.

Beyond the school, learners also considered water issues in the broader community and enquired specifically about water use at home.

The results of some of the above-mentioned enquiries are listed below. The teacher interview conducted by learners with one of the other teachers extended the understanding of the sanitation problems. The interview responses types up by the teacher recorded that in addition to the problem of vandalism and theft of copper pipes (reported above) poor construction planning and overcrowding (bad quality toilets and bad drainage) were contributing to leakages which in turn were affecting the infrastructure and creating serious air pollution from the bad smell. The teacher also commented that:

1. *It is a health hazard to educators, learners and anyone who is subject to it*
2. *This situation is not in line with the occupational health and safety regulations (PortXN-LU2)*

In learners' work reported from their lesson plan 1 investigation of water waste 'hot spots', learners noted that the sanitation problems contributed to them going home early from school.

Beyond the school, in the community, learners identified a number of water supply issues translated as follows:

Water in the area that we live:

1. *In this area (KwaWonkewonke) people are stealing copper*
2. *In Engxasheka there are no taps so the water is leaking.*
3. *In (Koo C Disiya Ekaetsi) the pipes are broken*
4. *The taps do not close (PLATE 26, Photograph 96)*

Action orientation

Learners were involved in a number of actions in order to respond to the water and sanitation problems in their school:

- 1) Learners designed a policy for their school. They also took action in response to the policy, for example, they put a bucket under the leaking taps and re-used the water for irrigating veggies in the food garden.
- 2) In a letter to their ward councilor learners outlined the problems in the school.
- 3) Learners designed water saving placards with the idea of influencing other learners.

These actions are discussed further below.

On reflection in her portfolio, Zodwa commented on the success of the placards in raising awareness amongst teachers and other learners (PortXN-LU3). She noted: "I have experienced that I must never under-estimate learners. I have seen the manner in which they could discuss and write their plan of action like identifying relevant people, the places they have identified in the community with leaks etc." (PortXN-LU2). She also noted that "they enjoyed doing things on their own and they were proud of their work" (Port XN-LU3).

The policy statements reported above were all entirely feasible actions to either reduce or re-use water. However, in the interview conducted by learners, an educator identified the following as necessary to improve the sanitation problems in the school:

Building additional toilets

Improve water supply

Employ general workers to clean and look after them

*Security measure be put in place(response typed up in English by Zodwa
(PortXN-LU2)*

This highlighted a greater challenge for change which the learners partly took up by writing to

inform the principal and municipal ward councillor of the situation. The letter to the principal and school governing body has been translated as follows:

To the Principal and the School Governing Body

Learners of Grade 3 have a problem. The water is wasted at school. There is no water here at school. The air is polluted because of the bad smell from the toilets.

- 1. We ask for tanks so when it rains we can collect water.*
- 2. We ask you to fix the pipes and the taps.*
- 3. We ask for plugs for the basins.*

Children of Grade 3 (PLATE 25, Photograph 92)

Learners received a reply from the ward councilor⁴⁵, which has been translated as follows:

Thank you for the letter you wrote me. I am glad you told me about the things that are happening in your community. I promise you these things will be taken care of by the municipality immediately.

Yours faithfully

M. Dinizulu (PLATE 25, Photograph 93)

In 2011 I asked Zodwa about the outcome of this communication. She replied: “The councilor worked hand in glove with the community police, local policing forum, ward committees and residents to address the issue of vandalism – at community meetings where residents could act as watchdogs for their school” (IC3).

Deliberation and co-engagement

This section discusses the scientific and value-based engagements with the environment and sustainability concepts raised during the lessons.

The following list summarises the foundational scientific and social science knowledge signified by the topics Mhizana introduced to her learners over the three lesson plans, as well as an explanation of the methods she used with each new topic or concept. This knowledge is grouped in three categories: a) Process skills, b) Nature and causes of issues, c) Problem-solving and ‘how-to’ knowledge.

a) Process skills

⁴⁵The teacher only included the letter to the principal and the School Governing Body in her portfolio. Because of this reply from the ward councillor, it has been assumed that the letter to the ward councillor had similar, if not the same, content.

- Measuring liquid (units and containers) Learners read off volumes from different containers and were able to measure water leaking from taps into a bucket.
- b) The nature and causes of water waste issues
- Water waste activities and hazards: Zodwa shared this information with learners by using a poster and extracts from a textbook. This knowledge was further stimulated when Zodwa used a picture of a leaking tap to stimulate discussion. During this discussion learners gained knowledge that:
Leaking taps cause water waste; water is being wasted by people in the community who steal copper in order to generate income when they sell it at 'Chix' [a local scrap dealer]. Leaking taps cause marsh places. The stagnant water below the taps in the community and at school has a bad smell. The air they breathe is polluted. (PortXN-LU1)
 - Causes of water shortages: This knowledge was obtained from a story extracted from a textbook which Zodwa read to learners.
- c) Problem-solving and 'how-to' information
- How to conserve water: This was a textbook extract given to learners. Learners included water-saving techniques in group work and individual writing after being shown the water saving practices in the school at the time. They also gained information from a story about which they answered questions. Further information was gained from an interview with parents about water saving techniques in the past and now; and from a discussion about water conservation methods in home, school and community. This was consolidated when learners wrote individual poems about water conservation.

In addition to scientific and social science knowledge and processes, Zodwa also introduced value-based discourse into her lessons. The text for the pledge that learners made regarding water saving was extracted from a textbook. By signing the text learners made a “promise to respect water and biodiversity, use water wisely, not pollute rivers and help in solving water related issues” (PortXN-LU1).

Evidence of learners applying the above-mentioned knowledge in critical, deliberative co-engaged processes can be found in learners' volunteering and enacting action in response to identified issues. Such a case is Zodwa reporting that: “At the end of the lesson they did realize that many learners did not care about water. They volunteered to take responsibility of taking an action plan in order to improve even at their homes. By telling parents to repair the

leakages, to use washing basins at school” (PortXN-LU2).

Evidence of learners acknowledging responsibility for water conservation can also be seen in the policy statements (PortXN-LU1 – learners’ work) about turning off the tap regardless of who left it on, and of reporting abuse of water to an authority figure. Zodwa’s report that “the learners are watchdogs for those who leave taps leaking, they report them to me to also teach them not to waste water but close taps tightly” (PortXN-LU2) is indication of policy implementation. This sense of responsibility may have been reinforced by the resource learners were given to read in lesson plan 1.

Zodwa stimulated learners’ critical thinking when they measured the amount of water dripping from taps each day and used the captured water to water their school vegetable garden. She asked them which day the most was wasted and which day the least, and why this was the case (LU2 – Activity 2). The translation of one learner’s response (PLATE 25, Photograph 90) to worksheet questions is reported below:

Question: What day was most water wasted?

Answer: Thursday.

Question: Why was that?

Answer: We forgot to collect the water in the bucket

Question: Which is the day that we used the least water?

Answer: Wednesday.

Question: Why was that?

Answer: We used a bucket so that water would not be wasted.

Question: What is the reason that water is wasted each day?

Answer: The pipes are broken.

These answers do not correspond logically to the graph presented in (PLATE 24, Photograph 89). This may be due to the fact that during the course teachers tended to trial and repeat activities and so a direct link between the graph and the worksheet cannot necessarily be made. Therefore these activities cannot be used to reflect on the rigour of graph interpretation, however they do indicate that Zodwa had an interest in stimulating critical thinking through encouraging learners to make meaning of the graph. Significant in this worksheet is the ambiguity in the word ‘wasted’. It is not clear whether the learners had separated the two senses of wastage: a) that water was wasted because the ‘pipes were broken’ and b) that they (the learners) wasted water by not collecting water from the dripping taps in a bucket to use it elsewhere (in their vegetable garden).

In another example reflecting the stimulation of critical thinking: In lesson plan 3, Zodwa reported that learners motivated answers to why some households used more water than others “with valid reasons” (PortXN - LU2).

7.3 CONCLUSION

This chapter has described a challenging socio-economic context in which the six teachers participating in the study were working. All community contexts displayed aspects of poverty such as unemployment and food insecurity. The rural schools were particularly affected by soil degradation and water supply with water supply in one of the schools being particularly limiting on the school garden. All of the schools were dependent on a school feeding scheme to supplement the diet of needy learners. Four schools attempted school vegetables gardens as action projects, while three of them linked these directly to their nutrition lesson plans and the fourth school linked her successful permaculture garden indirectly to her lessons on water through using it as a reference for successful water saving/harvesting practices. This fourth school also had a successful recycling project reported at the beginning of the course. Two of the urban schools had a particular interest in waste and waste management. Both had support of their school, while in the one school particularly strong community relationships appeared to have been built. All schools had supportive governing bodies, parents and principals at the start of the project, but one of the principals began to challenge the ‘out of classroom’ project work and human resources became a problem for maintaining the environmental projects in the school. Across the schools a number of organisations were operating supporting school gardens and tree planting, and providing seedlings and water tanks in particular.

A summary of teacher and classroom context presented in this chapter reveals similar traits and contexts. All teachers had university qualifications: Three teachers’ highest qualification was a Bachelor of Education (Honours) (while one of these completed a Masters Degree in Education after the course), two teachers were Bachelor of Education graduates (one of these completed an Advanced Certificate in Education with an Environmental Education specialisation after the course), and one teacher was a Bachelor of Arts graduate with an Advanced Certificate in Education specialising in Technology. The under-qualification of South African teachers was reported in Section 1.5. Considering qualification as an indicator of competence, this group of teachers was likely to be highly competent relative to the average South African teacher. All teachers taught Xhosa-speaking learners in the Foundation Phase (either Grade 1, 2 or 3), with one teacher teaching a multi-grade classroom of Grades 1 and 2. All teachers felt that there was a resource-shortage for some aspects of their work, but all were resourceful in terms of finding, developing and adapting learning and teaching support materials in order to meet their learners’ needs. Teachers used a range of methods in the classroom with ‘lectures’ being the most commonly used method and ‘practical classroom work’ the next most common. Only one teacher claimed to use ‘copying from the board’ as a primary teaching method. Learners researching information or gathering information in the

community were the least commonly used methods (although one teacher mentioned this as a priority method), and there was little emphasis on fieldwork and classroom experimentation. Overcrowding was a problem particularly in two of the classrooms. All teachers expressed a commitment to their learners, and shared anecdotes of their involvement beyond the call of duty in different ways that supported learners in their home lives and in their academic development at school.

This chapter presented two or three lesson plans per teacher covering the themes of nutrition, waste, and water and sanitation. A summary of selected curriculum requirements presents Life Orientation as the most commonly used learning area (used by all teachers in at least one lesson plan and by five teachers as the main learning area). The use of these three learning areas reflects curriculum policy for Foundation Phase in which learners are taught three 'learning programmes' – Life Skills with Life Orientation as the main learning area, Numeracy with Mathematics as its main learning area, and Literacy with Home Language as its main learning area (Section 1.3).

The most commonly used Learning Outcome was the Life Orientation Learning Outcome 1. Its focus on 'making informed decisions regarding personal, community and environmental health made it an obvious choice for supporting environmental learning. This learning outcome was selected as the focus for all of the teachers' first Lesson Plans. The focus on supporting teachers to develop activities for working with information (in Learning Unit 1 of the Schools and Sustainability Course) appears to have supported 'informed decision making'. That is through the development of knowledge about the link between recycling and environmental health, a healthy and balanced diet, and the importance of and ways of saving water.

Popular enquiry-based selections were the second most commonly used learning outcome. It is likely that the Schools and Sustainability Learning Unit 2 emphasis on enquiry influenced these choices. The enquiry-based selections included Mathematics Learning Outcome 5: 'Data Handling' (by four teachers), and Social Sciences: Learning Outcome 1: 'Exploring Issues' (used for integration by three teachers).

The lesson plans show that many skills-focused learning outcomes were chosen by teachers which meant that the knowledge could be dictated by the environmental interest stimulated by the picture-scope activity that teachers conducted in Learning Unit 1 of the Schools and Sustainability course (Section 6.2) or by an integrated learning area with content specified (Section 6.4.1.2). Examples of learning areas and skills chosen were: Life Orientation –

personal development, and problem-solving; Arts and Culture – participation and collaboration; Home language – writing, and thinking and reasoning; Mathematics - data handling; Natural Science – scientific investigations; Social Science (History) – historical enquiry.

The knowledge foci in the curriculum requirements chosen by teachers were found in: Economic and Management Sciences – introducing the economic cycle and economic problem, and the concept of alternative good; Natural Sciences – indicating some aspects of nutrition in the Intermediate Phase; and Social Science (Geography) – indicating lists of issues, processes and water sources. The implication was that detail of the topics would be obtained through local enquiries, or from other information resources such as textbooks or through research. Some distinctly omitted knowledge foci were ‘reduction’ as a way of responding to the economic problem; in Economic and Management Sciences, the ecological implications of production (although in Social Sciences, this was addressed in the form of the topic of ‘pollution’).

In a workbook activity, the Schools and Sustainability Course encouraged teachers to reflect on what information they needed to support their above-mentioned chosen knowledge foci, where they would find it, and how they would use it (Sections 6.2 and 6.4.4). The course also supported this process through the provision of relevant learning and teaching support materials (Sections 6.2 and 6.3.3) in order to make available “a flexible range of learning support materials that can be selected and adapted for use in a local context” (Lotz-Sisitka & Raven, 2001: 44 – Sections 6.2 and 6.3.3. This aspect of the course is evident in the data presented in this chapter reflecting teachers’ wide creation, adaptation and use of different learning and teaching support materials and different ways of working with them. Teaching and learning support materials created were: flash cards developing knowledge of how to make items from waste, posters on how to make compost and different types of waste, and stories sharing knowledge of social-ecological complexities of environmental concerns. The following teaching and learning support materials were found and used: Worksheet pictures representing different food types, types of dustbins and how to make paper, were cut up, labelled and sorted. Ready-made posters were used to stimulate discussion of food groups, cleanliness, waste management in the school grounds, water waste and water hazards, and sources of water. Worksheets were used that developed knowledge of how to re-use different waste items, to categorise healthy and unhealthy food, to distinguish fruit from vegetables, to construct a healthy meal and to write about different ways of saving water. Finally texts were drawn on for learners to read and to give them knowledge of how to save water, waste policy and regulation, and human rights.

Many of the skills identified were focused on enquiry namely: enquires, investigates, explores, collects, sorts, describes and interprets data, estimates, uses measuring instruments, orders three dimensional objects, constructs pictographs, asks questions, offers explanations, identifies issues, describes issues in local context, identifies similarities and differences, and classifies information. These skills relate to modes of enquiry explicated in the different learning areas. The Social Science (History) mode of enquiry involves asking questions, finding information, and organising, analysing and synthesising information (Section 7.2.5.3) and in the Social Sciences (Geography) the mode of enquiry is focused on exploring issues which is elaborated as identifying, understanding and making choices about an issues with representation methods such as graphs, tables, maps, photographs and images in order to support this (Section 7.2.1.3). In the Natural Sciences a positivist experimental mode of enquiry is explicated with suggestion for data representation methods such as posters, pie charts, graphs, concept maps and diagrams (Section 7.2.4.3). The Mathematics curriculum explicates a mode of enquiry requiring collecting, sorting, describing and explaining collections of objects with pictographs as a dominant data representation method in the Foundation Phase (Section 7.2.2.3).

For all of these learning areas, the curriculum leaves it to the teacher to find examples of various tools to support the enquiry and representation methods explicated in the introduction to each learning area. The Schools and Sustainability course supported this need through workbook activities where teachers needed to reflect on and develop their own qualitative and/or quantitative enquiries and supporting tools (Section 6.2). Examples presented in this chapter of enquiries that teachers developed themselves were: Qualitative audits of composting practices, differences between plots in the school garden, changes in the amount of waste in the classroom bins after re-use and recycling activities, listing food eaten in the community in the past and in the present, collecting and labeling indigenous wild vegetables found in the garden, and identifying water saving techniques in the school permaculture garden. Quantitative audits included eating habits at home, what children ate for breakfast, and water lost from dripping taps. Besides developing their own enquiries, teachers also drew on textbook enquiries which were copied for learners. These included: Qualitative audits of a local dump site, waste en route between school and home, water waste hot spots in the school grounds; and a quantitative audit which consisted of sorting and counting different types of waste.

In response to the action oriented emphasis in Learning Unit 2, action or activity-based curriculum skills chosen by teachers included: solves problems, makes informed decisions and offers solutions; enabled by skills such as: recycling, and ‘makes a product’. Personal

skills such as: personal problem-solving, negotiation of conflict, confidence in right to ‘have a voice’, applying group work skills were also chosen. Literacy skills such as ‘reading the world’, writing facts and imaginative texts, writing with ease, speed and in a given time-frame, and reporting were also integrated into the lesson plans. This chapter presented evidence of learning and teaching support materials used to support action-taking, namely worksheets illustrating how to make paper and how to make different items from waste.

Values evident in the curriculum selections made implicit references to human and children’s rights and redress in response to persistent inequality in South Africa; ecological health and responsibilities towards the environment; and participation, democracy and environmental justice. These implicit references were identified with the assumption that learning outcomes and assessment standards were intended to be underpinned by the stated role and purpose described in the introductory chapters of each learning area. Of the chosen learning areas, only Arts and Culture failed to advance at least an implicit interest (beyond the first principle) in social-ecological relationships. A consideration of the null curriculum highlighted emphases in economic growth, economic rationale for sustainability practices, and assumptions that recycling is good.

This chapter presented six descriptions of the active learning process – one for each teacher. The ‘*situated learning*’ sections of these descriptions focused on how **everyday knowledge** (including **indigenous or cultural knowledge**) had been situated in relation to abstract knowledge, how learning had been related to **everyday experiences and realities**, and how everyday knowledge and experience had been further explored through **local scientific and social science enquiry**. Learners were engaged in situated learning enquiries (see the enquiry dimension of the active learning framework as supported by Learning Unit 2 of the Schools and Sustainability Course) that included investigation in home communities, field trips and enquiries in the school yard, using questionnaires, audit sheets and picture drawing. Enquiries and new information were reported in the form of posters, pictographs, bar graphs, letters, and poems (reporting in the active learning framework). The ‘*action orientation*’ sections reported actions in response to environmental issues and concerns (see the action dimension of the active learning framework as supported by Learning Unit 2 of the Schools and Sustainability Course). These included making paper and fireballs, setting up waste management systems to recycle and re-use waste, setting up vegetable gardens, including wild vegetables in school gardens, contributing to water policy in the school and lobbying amongst leaders to address water and sanitation issues.

Even beyond the formal course expectations and learning area requirements (chosen for their lesson plans), teachers involvement in the Schools and Sustainability Course appears to have encouraged them to address broader school and community concerns such as through contributing to the school feeding scheme and through organising social grants for parents of learners in need.

The '*deliberation and co-engagement*' sections of this chapter reported topics that signified a variety of scientific and social science knowledges. Not all knowledges were signified across all cases, but overall they included: 'Definitions and concepts', 'Historical practices', 'Nature and causes of issues', 'Regulation/policy', and 'Problem-solving or how to knowledge'. Teachers used a variety of methods including story-telling, poster and picture discussions, ordering and matching of pictures, demonstrations, 'teacher-tell' presentations, and flash cards in order to share and help learners to construct new knowledge in the process of deliberation and co-engagement. These can be related to the 'information' and reporting (or reflection) dimensions of the active learning framework as highlighted in Learning Unit 1 of the Schools and Sustainability Course.

The following chapter uses the descriptions presented in this and the previous chapter in order to develop an overview of transformative praxis through emergent active learning processes in schools.

CHAPTER 8: DISCUSSION

8.1 INTRODUCTION

The previous two chapters presented data that feeds into the first research question: ***How do emergent active learning processes manifest as transformative praxis in the context of teacher professional development?*** The emphasis was on the first two goals of this study: Goal 1: “Describe the key influential initiatives, orientation, interactions and deliberations of the Schools and Sustainability Course” and Goal 2: “Describe the context, planning and implementation of active learning processes in terms of their espoused and/or actualised situated, action-oriented, and deliberative and co-engaged nature”. In this chapter, these two preceding chapters will be discussed with reference to theoretical and contextual perspectives presented in Chapters 1 to 4 and in relation to Question 1, Goal 3: “Use the ontological-axiological chain (MELD) to explain the relationship between active learning processes and transformative praxis”. This part of the research question is fully addressed in Section 8.2. Section 8.3 reflects on the analysis in Section 8.2 to formulate a discussion on Question 2: ***How can dialectical critical realism contribute to environmental education research?***; Goal 5: “Reflect on the ontological-axiological chain (MELD Schema) as a tool for analysing emergent active learning processes”. This latter section also draws on Chapters 2 and 5 which explicate the underpinnings and methodological implications of critical realism in educational and environmental education research. The discussions in Sections 8.2 and 8.3 are structured in the form of two sets of analytic statements which discuss the research findings in terms of the two questions respectively.

8.2 TRANSFORMATIVE PRAXIS THROUGH EMERGENT ACTIVE LEARNING PROCESSES

As noted above, this section reports on the third goal of this research: Use the ontological-axiological chain (MELD) to explain the relationship between active learning processes and transformative praxis. The discussion is based on the Phase 2, Node 5 analysis of the research (Section 5.7.2).

While, for analytic purposes, a series of analytic statements which will be described below present the stages of the MELD schema as separate entities, it is important to see each stage as emerging diachronically from the previous stage. The emergent nature of the MELD chain is captured by Bhaskar’s representation of 4D>3L>2E>1M in Section 2.6.5. This enables a view of transformative praxis as it (potentially or actually) manifests as transformative agency

(4D) founded in value-based choices for greater completeness (totality) (3L) based on explorations of absence and absencing processes (2E) and growing out of real possibility (1M). To ensure that the analytic statements detailed below are seen in the light of a broader process of transformative praxis, a brief summary of the emergent active learning processes in each of the cases is outlined below. However, before these cases are outlined, a brief reflection on how the Schools and Sustainability Course supported opportunities for transformative praxis is outlined below.

In order to support an understanding at 1M of “a world, both natural and social, in which things happen according to causes and the nature of entities, independently of our understanding of them” (Norrie, 2010: 13 – Section 2.6.1), Learning Unit 1 supported teachers to find, adapt or develop relevant information to use in their lessons. This information included policies and rights and responsibilities associated with these, knowledge of social-ecological realities in the South Africa context, knowledge of biophysical processes (such as human nutritional needs and natural recycling processes) and cultural knowledge (such as knowledge of edible wild plants). In order to develop an understanding of processes of “spatio-temporal ‘becoming and begoing’” (Norrie, 2010: 32 – Section 2.4) at 2E, the course supported the development of quantitative and qualitative enquiries (in Learning Unit 2) that enabled learners to understand the nature of social-ecological interactions in their own contexts. These enquiries exposed inconsistencies “caused by incompleteness (some relevant conceptual or empirical absence)” which became the drivers for transformative praxis (Hartwig, 2007: 175 – Section 2.6.3). In order to ensure that transformative praxis was informed by an understanding of a “greater completeness (totality)” (ibid.) and elimination of “the prejudices, errors, unsupported claims and philosophical false trails which have covered or disguised reality for us” (Corson, 1991: 232 in Shipway, 2001 – Section 4.2.3) at 3L, the responses to social-ecological concerns were couched (by work in Learning Unit 1) in an understanding of the “relationship between human rights, social justice, a healthy environment and inclusivity” as espoused in the first principle of the RNCS (South Africa. Department of Education, 2002j: 10 – Section 1.3). Learning Unit 2 also supported the 4D “unity of theory and practice in practice” (Bhaskar, 1993: 9 – Section 2.6.4) by supporting teachers to involve their learners in direct or indirect actions that were grounded in ontological realities identified at 1M, responded to inconsistencies identified at 2E, and guided by “a shift or switch to a new way of being and seeing” (Wals, 2009: 385 – Section 3.4) at 3L.

In the following paragraphs, brief outlines are given of how active learning processes emerged (in each of the six cases) from the opportunities for transformative praxis mobilised

by the Schools and Sustainability Course. These cases are described in terms of their broad relationship to the MELD schema.

Nokhanyo's and her learners' agency involved waste reduction activities such as recycling and re-use. There was a build-up of paper collected for recycling because there was no real possibility – no system in place – for managing the recycled waste or for collection of waste if it was not burned (1M). These actions emerged from a rights-based discourse including learners' rights as individuals to a healthy environment as well as their responsibilities as citizens to ensure others' rights to a healthy environment (3L). The actions were also emergent from understandings of the link between waste and (the absence of) human and environmental health and recycling and re-use as appropriate absencing processes (2E). Another intended action – composting – was dealt with predominantly at 2E – considering composting as a way of absencing the absence of healthy soil and of absencing (or at least reducing) waste in the school and community. However, this composting project was realised at 4D.

Weliwe and her learners were involved in waste reduction and recycling activities similar to the previous case. In addition learners and community members demonstrated transformative agency (4D) by proactively contributing to ongoing recycling and waste management initiatives. As with the previous case these activities emerged from discourse regarding rights and responsibilities (3L) and understandings of the absence of processes for absencing waste – such as waste management systems (bins) (1M). Actions were conducted in relation to developing social science understanding of the absence of a sense of responsibility in the face of waste management law and in relation to scientific measurements of waste reduction (absencing processes at 2E).

Nomhle and her learners demonstrated transformative agency by growing vegetables in their school vegetable garden (4D). This emerged from activities valuing of the rights of all children to a healthy diet (3L), and from understandings of health problems related to the absence of a healthy diet and fresh food (2E) in the context of learners' rights to a healthy diet, financial insecurity and unemployment (1M).

Mhizana and her learners demonstrated transformative agency by planting indigenous plants in their garden (4D). This emerged from activities valuing of the rights of all children to a healthy diet and a re-valuing of indigenous /cultural knowledge and resources (3L), and from understandings of health problems related to the absence of a healthy diet and fresh food (2E) in the same 1M context as described above.

Nomonde and her learners started a vegetable garden emerging from similar processes at 2E and 3L to Nomhle. However, with a 1M restriction on growing vegetables, that is degraded land exacerbated by drought; they were not able to enjoy as successful a harvest as in the above two cases.

Zodwa and her learners demonstrated transformative agency (4D) through a number of indirect actions such as placards to influence fellow learners and a letter written to the municipal ward councilor which catalysed a school-municipal-community response to the vandalism and disrepair of the school water and sanitation system. This activity emerged from value-based activities such as the development of a pledge to conserve water (3L) and understanding the importance of water and ways of absencing water scarcity particularly through permaculture techniques (2E), in the context of unemployment, lack of social cohesion and mechanisms to ensure learners rights of access to water and sanitation (1M).

These six cases of active learning processes emerged from specific contexts constituted by a number of generative mechanisms and structures. These structures and mechanisms are defined at the level of 1M non-identity (Section 2.6.1) in a MELD analysis of change. Most of these structures and mechanisms were not mentioned in the summaries above because there were many influences common across the cases and these are better detailed in the first analytic statement below.

The first four statements illustrate that active learning processes have the **potential** to emerge as transformative praxis when:

- Driven by 1M needs and wants, a transformative curriculum agenda, and Schools and Sustainability Course ideologies; combined with a particular teacher disposition (Section 8.2.1);
- Curriculum and professional development opportunities position transformative agency as a relational process between action projects and learning (Section 8.2.2);
- Curriculum and professional development opportunities position situated learning as a relational process facilitating understanding of complex laminated totalities (Section 8.2.3); and
- Curriculum and professional development opportunities position environmental learning as processes of values-based reflexivity rather than values imposition (Section 8.2.4).

The first statement is concerned with structures and mechanisms at 1M from which active learning processes emerge. The next three analytic statements (Analytic Statements 2 – 4) are concerned with the “positions and practices” evident in the curriculum and the Schools and Sustainability teacher professional development Course (Bhaskar, 1998b: 51 – Section 4.2.2). These positions and practices served as a system of mediating concepts representing a “‘point of contact’ between human agency and social structures” (ibid.) and had the potential (or not) to facilitate the emergence of active learning processes as transformative praxis in schools. These positions and practices represent contingencies that come into play when relating to “non-observable generative mechanisms whose powers may exist unexercised or be exercised unrealized, that is with variable outcomes due to the variety of intervening contingencies which cannot be subject to laboratory closure” (Archer, 1998a: 190 – Section 5.2).

The next three analytic statements (Analytic Statements 5 – 7) focus on how the curriculum and Schools and Sustainability positions and practices emerged as active learning processes in the schools. These latter three statements consider how relational situated learning processes enabled a developing understanding of the nature of environmental issues and their associated absences (concerned with 2E in the MELD Schema), how value-based reflexive deliberations influenced the development of the capacity for making informed choices that shaped emergent active learning process (concerned with 3L in the MELD Schema), and how action projects and associated actions in emergent active learning processes enabled transformative praxis through supporting the unity of theory and practice in practice (concerned with 4D in the MELD Schema).

8.2.1 Analytic Statement 1: A context of poverty and inequality, teacher disposition, and curriculum and course ideologies contributed to a transformational purpose underpinning emergent active learning processes

Introducing the analytic statement

This first statement considers the influence of poverty and inequality in emergent active learning processes in relation to explicit transformative curriculum intent and the Schools and Sustainability Course’s interest in highlighting these.

Absences largely described by a context of poverty and inequality

This study highlighted the prominence of three specific environmental issues across six cases – food security, waste management and water and sanitation. A common factor underlying all issues was poverty which, in these cases, affected the access of children to nutrition, health

and basic infrastructure, with the compounded effect of restricting access to education. Also underlying all issues was a context of inequality in South Africa which is especially high between rich and poor as indicated by the Inequality-adjusted Human Development Index (Klugman, 2010 – Section 1.4) and the high South African Gini score (Landman, 2003 – Section 1.6), inequality between rural and urban (United Nations, 2011 – Section 1.6), inequality across provinces as highlighted van Niekerk (2011 – Section 1.6), inequality in infrastructural provision in formal and informal or township settlements (Section 4.7.3), and inequality across racial divides, for example in landownership (SADC et al., 2008 – Section 1.6) and education (Taylor et al., 2007 – Section 1.4).

The communities in which all cases were located, were reflective not only of the poverty prominent in the Eastern Cape – highlighted by unemployment, poor health care, lack of access to resources and HIV/AIDS – but, their context of rural or informal settlement situated them as amongst the most marginalised sectors of South African society in a country with one of the highest measures of inequality in the world (Section 1.6).

Out of a curriculum imperative to uphold the values calling for redress, equality and democracy as enshrined in the South African constitution (South Africa. Department of Education, 2002h – Section 4.5.1), the six teachers in this study developed lesson plans that responded to the context of poverty and inequality described below.

The teachers responding to nutrition were operating in a positive legislative environment with agreements such as the International Convention on the Rights of the Child, the Millennium Development Goals, and the South African Constitution intending to ensure adequate nutrition for children as a basic human right. Operational plans to address this on the part of the national government were the child support grant at a community level and the school feeding scheme at a school level (Section 4.7.1). However, children's rights to adequate nutrition were being violated in the sense that the feeding scheme was not always effective (George, 2007 – Section 4.7.1). High unemployment (CSIR, 2004 – Section 1.6) in the communities was argued to be a significant factor in influencing food security, particularly in the Eastern Cape, with poverty exacerbated particularly amongst marginalised black people who are excluded from owning the majority of farm land (SADC et al., 2008 – Section 1.6). All three teachers dealing with nutrition linked their response to food insecurity with vegetable gardening as a school environmental project. However, these gardens, started in the context of land degradation and drought in the Eastern Cape (Amathole District Municipality, 2010 – Section 1.6), made this a challenging response with varying successes across the cases. Another significant factor influencing these schools was their situation in rural

communities which experience lack of access to basic resources, increasing incidence of HIV/AIDS and poor health care (CSIR, 2004 – Section 1.6). School children in these communities tend to experience difficulties such as having long distances to walk to school and being involved in chores when they should be at school (Community Agency for Social Enquiry & Joint Education Trust, 2007 – Section 1.4).

The two teachers responding to problems of waste management were supported by a positive legislative environment in the form of the National Environmental Management Waste Act which promotes waste minimisation, re-use and recycling (Section 4.7.2). However both schools were situated in ‘township’ areas with high population increase (3.1% over six years) which were beset with problems of implementing general waste management strategies (SADC et al., 2008 – Section 1.6; Buffalo City Municipality, 2008 – Section 4.7.2) with little room for more complex recycling strategies (South Africa. National Government, 2008 – Section 4.7.2). It was in this context that both teachers responding to waste issues started to explore, with learners, alternative ways of managing waste.

The teacher responding to water issues did so in the context of a country with high absence of basic water supply and sanitation” (Muller, 2002 – Section 4.7.3). The school in which this teacher was working was serving a community experiencing illiteracy, high population, crime and drugs (Section 7.2.6.1). Despite modern buildings, this school’s condition was not unusual and is replicated in the Eastern Cape’s many informal settlements suffering from inadequate roads, electricity supply, piped water and waste and sanitation systems (SADC et al., 2008 – Section 1.6) with an urban population growth which initially outstrips the capacity of municipal authorities to provide the necessary services and infrastructure (ibid.).

The absences discussed above are highlighted in Table 8.1 below which considers absent experiences, absent events and absent structures and mechanisms by making use of Bhaskar’s concept of stratified reality (1998a – Table 5.1) to construct a depth picture of reality in the context of the three issues addressed by teachers participating in the study.

Table 8.1 Collective summary of absences associated with the issues of nutrition, waste and water and sanitation at different levels of reality by six teachers

	<i>Nutrition</i>	<i>Waste</i>	<i>Water and Sanitation</i>
<i>Absent structures and mechanisms</i>	Absence of: Employment, financial security, efficient mechanisms to ensure the right of access to food in the South African Bill of Rights, healthy soil, sufficient water, ability of soil to absorb water (in the face of drought)	Absence of: Waste management structures, mechanisms to ensure adherence to waste regulation, and functioning recycling systems	Absence of: Mechanisms to ensure rights of access to water and sanitation, appropriate infrastructure
<i>Absent events</i>	Absence of: Efficient school feeding scheme, regular/quality meals	Absence of: Waste collection	Absence of: Planning and good construction of facilities
<i>Absent experiences</i>	Absence of: Health (inadequate nutrition affects those living with HIV/AIDS), ability to concentrate in class, access to education (in the face of hunger)	Absence of: Clean schools and communities, healthy bodies (because of exposure to disease)	Absence of: Clean school, healthy and hygienic bodies, access to education (in the face of ill-health)

A transformative intent underpinning emergent active learning processes

A review of the explicit, implicit and null curriculum evident in learning outcomes and assessment standards used by teachers in lesson planning highlighted that values emphasising human and children’s rights and redress in response to persistent inequality in South Africa; ecological health and responsibilities towards the environment; and participation, democracy and environmental justice; were implicit in learning outcomes and assessment standards because they were stated in the role and purpose described in the introductory chapters of each learning area. However, without knowledge of the content of these introductory chapters (as promoted in the Schools and Sustainability Course Learning Unit 1 – Section 6.2), the transformative intent in these values can be lost. Evidence of a transformative ideology in the Schools and Sustainability Course is found in a tutor’s comments regarding our role as responsible citizens that “we need to express our opinion about how we should be or could be or aren’t or whatever” (Section 6.4.1.3) thus drawing on the above-mentioned implicit values to super-impose a transformative agenda on a Home Language Learning Area interest in ‘thinking and reasoning’.

An influencing factor in strengthening the transformative intent of the curriculum was the disposition of teachers to take on a pastoral role (South Africa. Department of Education, 2000 – Section 4.3.3) in the school. This was evident in one of the teacher’s descriptions of

herself as “mother, community member and member of the church” influencing her personal involvement with learners that needed extra care (Section 7.2.2.2) or another teacher explaining how she could not avoid getting involved in situations, for example, where a child is coming to school hungry and looks to the teacher as a parent (Section 7.2.5.2). However, another teacher saw her primary role as educating learners and secondly to cater for their well-being (Section 7.2.3.2). This commitment by teachers needs to be seen in relation to Morrow’s question: “does learner-centred education imply that teaching includes taking account of the detailed conditions and circumstances of the personal lives of learners? And what happens if a teacher has not one learner, but a couple of hundred”? (Morrow, 2007 – Section 4.3.3). Limits posed by a legislated inflated role of teachers presented a possibility that teaching would be compromised by stretching teachers too thinly to meet all the expectations of them, yet, in this case, active learning processes catalysed the elaboration of these roles amongst a well-qualified (relative to the South African norm) group of teachers (Section 7.3) demonstrating both the disposition and capacity to meet these requirements. This interest in teacher disposition and skills has been driven by Bhaskar’s argument that disposition and skills (the level of which can be implied by the level of a teacher’s qualification) are two of the influences in rational agency (1993 – Section 2.2). This information can be seen as part of a teachers’ “life narrative or her biography” (Bhaskar, 1993 – Section 2.4) which helps us to understand a teachers’ “stratified personality” at Plane [d] in the four-planar social being model (Bhaskar, 1993: 163 – Section 2.4).

Identifying environmental issues through the Schools and Sustainability Course

Environmental issues and risks were brought to the fore in the Schools and Sustainability Course (Learning Unit 1) through the use of a picture-scope where learners were given an activity to identify and draw issues of concern to them in their local community towards a photonarrative approach to auditing environmental issue and risk (Sections 6.2 and 6.3.1). Issues were also identified through school audits for those that had registered as Eco-Schools (Section 3.3.3). Teachers brought the results of these audits to their district meetings and this influenced their choice of lesson plans for the rest of the course, thus highlighting how the spiral approach of the Schools and Sustainability Course enabled a contextualising process where teachers worked with “challenges from their own socio-political, biophysical and educational contexts”, flexibility in response to different contexts and different needs, and democracy embracing “negotiated self-determination and transparency” (Doc 17 – Section 6.3.2.1).

Summary and implications for transformative praxis

This first statement has highlighted the context of poverty and inequality and particular absences related to the issues of concern identified by teachers participating in the study. The absences described can be seen as “absence as product” which is a 1M concern in the MELD Schema (Hartwig, 2007 – Section 2.3). It is possible to see how these absences imposed “constraints on desires, wants, needs and interests” (Bhaskar, 1993: 175 – Section 2.2), for example, constraints on access to healthy food, running water, clean and functional sanitation facilities, and a rubbish-free and healthy environment. The statement has also highlighted how a transformative course ideology and teachers’ pastoral dispositions resonated with explicit transformation interests defined in the role and purpose of different learning areas and how tutors worked with teachers to ‘bring out’ this explicit interest by applying it to curriculum learning outcomes. This transformative interest was applied in the context of environmental issues which were identified through a Schools and Sustainability Course activity entailing the use of a picture-scope. This transformative agenda thus had the potential to influence a change-oriented focus for emergent active learning processes in the course. This change-oriented focus is explored further in the next analytic statement.

8.2.2 Analytic Statement 2: An iterative relationship between ‘learning’ and ‘doing’ can influence the emergence of active learning as transformative praxis

Introducing the analytic statement

This analytic statement explores the emergence of the action-oriented nature of active learning from a transformative agenda of education, environmental education and Schools and Sustainability Course ideology. This is entwined with an action orientation’s converging and diverging relationship with the deliberative and co-engaged nature of active learning as it, in turn, emerged from South Africa’s post-apartheid curriculum with both progressive and radical competence elements (Taylor, 1999: 111 – Section 4.3.2). The discussion revolves largely around how the concept of action has been influenced and perceived rather than how it is has been enacted, and makes recommendations for refining its interpretation in the environmental education field.

Relating an action-orientation in education to transformative curriculum intent

A resonance of environmental education with the transformative intentions of curriculum in the country is illustrated in South African environmental education interests in “problem-solving”, “critical action” and “ways of doing things differently” (O’Donoghue et al., 2007: 7 – Section 3.3); influences on environmental education in South Africa such as the concept of

education *for* the environment calling for counter-hegemonic processes (Fien , 1993 – Section 3.3); and action competence calling for actions (direct or indirect) that are conscious and targeted at environmental issues (Jensen and Schnack, 1997 – Section 3.3.2).

A transformative agenda is also evident in South African environmental education in the trends towards action and issues-based approaches to learning; with a significant distinction made between activity-based or hands-on learning and action learning; the latter being a response to environmental issues and risks, as opposed to simply doing for the sake of doing (Schudel et al., 2008c – Section 3.3.2). An interest in ‘response to an issue’ does not necessarily need to be interpreted as tangible action or even indirect action, but can simply be interpreted as a value-argued response or a structured argument reflecting on sustainable lifestyle choices. For example, a value-argued response is reflected at 3L in the MELD schema where there is an interest in “a move to greater completeness” generated by inconsistencies “caused by incompleteness (some relevant conceptual or empirical absence)” identified at 2E (Hartwig, 2007: 175 – Section 2.6.3). A strong influence on the Schools and Sustainability Course, the NEEP-GET programme highlighted a need to “focus on problems in meaningful ways” and develop “insights and competence for making better environmental management and lifestyle choices” (Section 6.3.3.3). This has no explicit emphasis on tangible action and reflects opportunity for a developmental interest in change (Wals & Jickling, 2009 – Section 3.4).

A stronger ‘action-oriented’ intent can be found in the *Learning for Sustainability Project* roots of the Schools and Sustainability Course (Section 6.3.2.1) with the critical action research interest in changing not only practice but the context in which practice takes place (Janse van Rensburg, 2000 – Section 4.3.5). The Schools and Sustainability Course detailed a specific learning outcome that teachers were expected to “help learners to develop a response to environmental issues” (Table 6.3 – Section 6.3.2.2). The idea of ‘response’ was elaborated on the course as a direct or indirect action project – as described in Learning Unit 2 (Section 6.2), detailed in Appendix P, and applied in the practice-based discourse as described in Section 6.4.6. The implicit interest in a response as some kind of action is also evident in the title of Learning Unit 2 – “Environmental enquiry in lesson planning **towards environmental improvement**” (Schudel et al., 2008c, my emphasis).

Earlier research in the Department of Water Affairs and Forestry cohort of the course which expressed concern with the lack of “tangible change” was influenced by the concern that indirect action can lead to “no action” and consequent feelings of disempowerment (Section 6.3.3.3). This illustrates links with concern over Utopianist ideals without critical

consideration of the practical adequacy of normative frameworks with a resulting empty moralising (Jickling, 1992; Lotz-Sisitka, 2008, Lotz-Sisitka & Schudel, 2006 – Section 3.4) through failure to ground ideas in real possibility, reasoned judgment and judgements of value – that is concrete Utopianism as elaborated by Bhaskar (1993, 2010 – Section 3.6.4). However, action seen as an end or a goal (as implied by the concern that no tangible change had happened) runs the risk of losing sight of the developmental (rather than behavioural) interest in change (Wals & Jickling, 2009 – Section 3.4).

The emphasis on action in the course was also influenced by the action dimension of the active learning framework (O'Donoghue, 2001 – Section 3.2). My earlier work, reporting on the Department of Water Affairs and Forestry course, emphasised practical action. This arose from a concern that action too hypothetical can be unrealistic if not grounded in “the practicalities and social and political implications of ... proposed actions” (Doc 13 – Section 6.3.3.3). However, there is also a converse side to the argument for practical action. That is that meaning-making can be sidelined when those involved in projects and practical actions (methods under the banner of ‘learning-by-doing’) may be so absorbed in the practical activity, that they neglect to reflect on what they are learning (Rosenburg, O'Donoghue and Olvitt, 2010 – Section 3.3.1). This was reiterated in NEEP-GET research with the concern that in the Eastern Cape “the focus of most programmes developed using the [active learning] framework was firmly on 'action', with limited analysis of issues or justification offered for particular actions relevant to environmental issues” (Raven et al., 2005: 28 - Section 6.3.3.4).

Reframing the notion of an action-orientation to learning

A challenge to the action-orientation of the Schools and Sustainability Course was raised by one of the school principals with the argument that teachers and learners should be in the classroom teaching rather than in the school grounds. This led to the discontinuation of the successful permaculture garden, recycling initiatives and Eco-Schools involvement in the school (Section 7.2.6.1). This argument was based on a dichotomy set up between action and learning.

By reviewing the implication in the Department of Water Affairs and Forestry report that we need practical action to ground transformative praxis, as well as the above example illustrating a dichotomy between action and learning; it is possible to reframe the problem in the light of Bhaskar's MELD schema (1993 – Section 2.6). This can be achieved highlighting that the problem is actually not about whether we act or not, but about the influence of generative structures and mechanisms (1M), understanding absences and absenting processes

(at 2E) and making reasoned choices (at 3L) out of which action might flow (4D). The reframing of this problem corresponds with O'Donoghue's statement that:

The illusion of a multiple choice (plurality) is not always seen as being in tension with greater reality congruence of one perspective over another. This can disable meaning-making engagement towards an agreed best perspective with an attendant social responsibility of accountability for continuing reflexive practice. (2007: 153)

Having highlighted this problem, O'Donoghue continues by calling for "social re-orientation, namely, *reality congruent knowledge, shared moral purpose and a situated capability developed within learning processes of active engagement in enquiring practice*" (ibid.: 153, author's emphasis).

These statements emphasise that active learning processes as transformative praxis cannot take a "leap-before-you -look" approach to environmental learning. Even if, making use of the active learning framework (O'Donoghue, 2001 – Section 3.2), a lesson is started with an action, this will not be the end-point; but will need to be combined with scientific, social science and value-based knowledge and enquiry for understanding and reflecting on the action.

This resonates with the discourse of South Africa's post-apartheid curriculum which Taylor describes as having both progressive and radical competence elements (1999: 111 – Section 4.3.2), through, firstly, the above-mentioned 'conscious targeting' which can be associated with the notion of action competence and a radical competence approach to curriculum. Secondly, it has resonance with a progressive competence curriculum model in the sense that there is a clear change agenda, but it needs to be done in a conscious way and not become "self-defeating through illusion, ignorance, false beliefs or sheer pig-headedness about what is possible and what is not" (Pendlebury, 1998 – Section 5.2). In the school context, potential for raised consciousness is reflected in activities highlighting an iterative relationship between action and learning. This was reflected overtly in the Eco-Schools Programme's interest in "lesson planning relating to school improvement projects" (Section 6.3.1). The Schools and Sustainability Course's activities also maintained a link between learning and action as is evident in course activities considering "action projects for school improvement", at the same time as "reviewing learning area purpose and scope, learning outcomes, assessment standards, and core knowledge for environmental learning opportunities" (Table 6.4 – Section 6.3.2.2).

Another reason for re-thinking the role of 'action' in the school curriculum is the argument that it is not the role of education to solve society's problems (Jensen & Schnack, 1997 – Section 3.4). Evidence of a teacher engaging with this question of the role of education is

found in the example of Nomhle questioning the purpose of teaching learners to grow vegetables. Nomhle highlighted that she was not teaching them in order that they might become young farm workers (Section 7.2.4.4). Here Nomhle appears to be alluding to the situation of the rural black population in South Africa who are workers on minority-white-owned farms (Section 1.6). This statement indicates solidarity with the progressive and radical competence approaches of the curriculum (Taylor, 1999 – Sections 4.3.2 and 4.4) – radical in challenging the status quo (a dispossessed black population who previously were prepared, by educational policy and action for a subordinate position in life – Harley and Wedekind, 2004 – Section 4.5.1) and progressive in a vision of developing sustainability practices that would at least empower the rural population with increased food security or, alternatively set them up with skills to own and manage their own farms. In Nomhle’s case she had achieved this latter vision in her own family as her son had bought a farm which they were going to start farming as a family (Section 7.2.4.2).

Reviewing instances of an action-orientation in the RNCS

With the Schools and Sustainability Course’s emphasis on making curriculum links, teachers were encouraged to look for opportunities for taking action through the curriculum. The action opportunities that teachers chose to work with were ‘recycling’ and ‘makes a product’ (Sections 6.4.6, 7.2.1.3, 7.2.1.3, 7.2.1.6). However, Nomhle’s choice of a Grade 6 assessment standard “participates in a problem-solving activity to address an environmental health issue” to use with Grade 1 and 2 learners (Table 7.10), implies that she had difficulty with finding a grade-appropriate ‘action’ imperative in the curriculum.

The null curriculum analyses (Sections 7.2.1.3 – 7.2.6.3) indicated that the curriculum provided no detailing of suggestions for how to go about recycling – for example, how to make compost, how to make recycled paper or how to set up a recycling system in the school. In other words, the absence of knowledge of small-scale sustainability practices (as proposed in Section 3.4) limits the action possibility in curriculum work. However, with the imperative for learning **in** action on the course, tutors encouraged teachers to “go beyond the curriculum” to find appropriate action (Section 6.4.6). This did not mean working outside of the curriculum, but expanding curriculum opportunities. Teachers achieved this by linking their action activities to explicit curriculum skills such as problem-solving, making informed decisions, offering solutions, negotiation of conflict, and reporting cases of abuse (Sections 7.2.1.3 – 7.2.6.3). They were thus relying on aspects of the curriculum that directly relate to the interest in progressive competence described by Taylor (1999: 111 – Section 4.3.2) as the competence to “ask questions, evaluate evidence, defend arguments, and apply ... knowledge to new situations”. This illustrates possibilities for problem-solving actions to enrich learning

without becoming a goal-oriented imperative and relates to Bhaskar's notion of 4D "unity of theory and practice in *practice*" (Bhaskar, 1993: 9, emphasis original – Section 2.6.4).

Summary and implications of this analytic statement

This analytic statement can conclude that transformative praxis in emergent active learning processes can be strengthened through drawing on both the radical competence and progressive ideologies of the South African RNCS. At the same time it needs to treat the action-orientated and deliberative and co-engaged nature of emergent active learning processes as being about the the unity of theory and practice in *practice* that emphasises an iterative relationship between 'learning' and 'doing' rather than 'learning-by-doing'. The statement highlights the importance of a balance between radical and progressive intentions in learning. The following analytic statement elaborates on the nature of learning as a relational process and how this can lead to active learning emerging as transformative praxis.

8.2.3 Analytic Statement 3: Relational situated learning processes can influence the emergence of active learning as transformative praxis

Introducing the analytic statement

Analytic Statement 1 highlighted the conditions that enabled and constrained transformative and progressive intentions influencing emergent active learning processes. This statement 'situated' learning **in** a particular context of poverty and inequality. This analytic statement takes the notion of 'situated in' further to ask the question: 'Situated in relation to what'? This statement considers how the RNCS curriculum and Schools and Sustainability Course structures, intentions and ideologies enabled or constrained learning processes situating local (including indigenous) knowledge and experience in relation to:

- abstract school knowledge;
- national and global perspectives and imperatives regarding issue and risk;
- structures and mechanisms out of which it is generated; and
- tensed socio-spatialising processes.

Further to this, the statement reflects on enabling and constraining conditions for value-based education in the Schools and Sustainability Course.

Influences on a situated approach to learning

An interest in situated learning in environmental education in South Africa comes through strongly, for example, in the active learning framework's "enquiry" dimension highlighting an interest in "investigations in local surroundings" (O'Donoghue, 2001: 7 – Section 3.2), and Fien's interest in education 'through' the environment (Section 3.3.1). The explicit, implicit,

null curriculum analysis reported in Chapter 7 revealed that the RNCS provided opportunity for enquiry through different modes of enquiry and data representation methods explicated in the introductory chapters of each of Natural Sciences, Mathematics, Social Science (Geography) and Social Science (History) curricula (Section 7.3). Evidence presented in this study suggests that lectures and practical classroom work dominated as teaching methods amongst the teachers before participation in the course, while more complex enquiry methods such as research, fieldwork and experimentation were less common (Section 7.3). To support enquiry-based situated learning processes, the Schools and Sustainability Course introduced teachers to enquiry-based teaching strategies using qualitative and quantitative techniques and tools such as ecological studies, observations using words or pictures, mapping, descriptive essays, surveys using interviews and surveys using questionnaires (Sections 6.2 and 6.3.3.2). Zodwa's surprise at young learners' abilities to discuss problems, and develop plans of action and their enthusiasm for working on their own (Section 7.2.6.4) and Nokhanyo's surprise at Grade 3s' ability to conduct an enquiry, indicate that employing enquiry and learner-centred methodologies was not a common practice for the teachers before the course.

Relating local knowledge and experience to school knowledge

The first relational question: "How is local knowledge and experience situated in relation to abstract school knowledge?", is driven by the concern that ignoring the boundary between everyday and school knowledge, can have an effect converse to its interest in increasing accessibility in education – that is by reducing epistemological access for many who do not have access to particular forms of reasoning (Giroux, 1980; Dean, 1999; Taylor, 1999 – Section 4.2.1; Lotz-Sisitka, 2009 – Section 3.4). It is also driven by research in southern Africa regarding indigenous knowledge in environmental education, which argues for the importance of establishing "processes of inter-epistemological dialogue, rather than an oppositionalized logic of 'contrasting' indigenous knowledge and Western Knowledge as two distinctly different ways of knowing" (Masuku Van Damme & Neluvhalani, 2004: 367).

This question becomes even more pertinent in a curriculum such as the South African RNCS where school knowledge was made even more inaccessible in a curriculum poor in content knowledge (Chisholm, 2000; Moll, 2002; Harley & Wedekind, 2004; Sayed, 2004; Dada et al., 2009 – Section 4.5.3). The RNCS for Grades 1-9 dealt with 'subject' knowledge in three learning areas (Section 4.5.2). The knowledge that was specified in the curriculum was noted as being "found in different forms in different documents and at different levels of specificity" as presenting a "thin, interspersed and inconsistently presented knowledge trajectory" (Dada et al., 2009). The review of explicit, implicit and null curriculum conducted for Chapter 7 illustrated this point. For example, knowledge of water sources was limited to

lists of different types in Social Science (Geography) or, in other cases, no detail was provided such as on the topics of ‘alternative goods’ and ‘nutrition’ or on processes such as the ecological implications of sustainable growth in Economic and Management Sciences or the problems and risks associated with pollution in Social Sciences (Geography) (summarised in Section 7.3). This became another case where the Schools and Sustainability Course encouraged teachers to ‘go beyond the curriculum’, for example in the discussion between tutor and teacher where the tutor noted that an activity relying on prior knowledge had met curriculum criteria (an interest in punctuation) for the Home Language Learning Area in which it was focused, but queried what “new environmental knowledge” was being presented (Section 6.4.1.3).

Elaborations on curriculum topics and concepts were contingent on teachers’ access to textbooks or, in the absence of these, to other knowledge resources which they would invariably need to adapt conceptually to the level of their learners and pedagogically to the learning outcomes required by the curriculum. With reports on poor access to textbooks, teachers’ difficulty with interpreting learning outcomes and assessment standards, and poor content and conceptual knowledge of teachers (Sections 1.4 and 4.3), this had the potential to leave learners and teachers at risk of operating in a knowledge vacuum and creating a case of “learner-centred emptiness” (Lotz-Sisitka, 2002 – Section 4.5.3) where learners are vulnerable to the creation of ‘conceptual muddle’ regarding learning area knowledge. In the case of this study, in an interview with a teacher, I indicated a concern that we were not able to supply enough contextualised materials (Section 6.4.4.1). This was re-iterated by Nomsa who indicated that despite being able to help teachers find relevant contextualised materials, she still felt that she was not able to supply enough (Section 6.4.4.1). However, teachers participating in the study indicated a disposition towards finding, developing and adapting materials to suit their needs (Section 6.4.4.3). For example one teacher specified that she saw the textbook as a starting point which she needed to flesh out (Section 6.4.3). Teachers’ disposition towards finding their own material and developing their own knowledge was evident from the teacher who described herself as ‘curious’ (Section 7.2.2.1), another who said she used the internet to find more information (Section 6.4.4), and another who explained how she followed environmental concerns in national media (Section 6.4.8).

Extracts from a language textbook used by one of the teachers was noted to have a variety of important language skills (Section 6.4.4.2). In this case the teacher managed to link a good textbook to her environmental learning agenda, but this may not always be the case and illustrates how when teachers are expected to contextualise learning by selecting and working with their own content (as is evident in Learning Unit 1, where teachers were provided with

or helped to find learning and teaching support materials to suit the context in which they were working – Section 6.2), these materials are not likely to be designed with a particular learning area in mind, thus compromising depth and scope of subject-specific knowledge. This is illustrative of the problem of compromised conceptual learning and progression within subjects discussed in Section 1.3 (Dada, 2009).

In the Schools and Sustainability Course, teachers were encouraged to think about how they would use new knowledge to encourage learners to use information actively (including adaptations for appropriate breadth, depth and complexity). To this end, strategies such as peer teaching, summarising, drawing pictures from text or vice versa were discussed (Section 6.3.3.2). The Schools and Sustainability Course also encouraged teachers to develop links between their own prior knowledge and abstract knowledge, particularly in Learning Unit 1. In this unit teachers used case studies and pictures to stimulate discussion about environmental issues (Section 6.3.3.4) and relate this to local context – as illustrated by the title of the first learning unit "Environmental Learning in the curriculum and information in local context" (Doc 16 – Section 6.3.3.4). This reflection on environmental issues was extended into district workshops as evident in the spontaneous discussion on the effect of re-use and recycling on the extraction and manufacture of materials and goods (Section 6.4.2). This illustrates how “the extended time frame and frequent dialogue that form part of the spiral orientation to professional development encourage the development of increasingly complex understandings around educational and ... environmental themes” (Doc 17 – Section 6.3.2.1); and also how this enabled the course to respond to NEEP-GET concerns that “there is need to support teachers to develop foundational knowledge of environmental issues and risks, as many interpret these superficially” (Doc 4 – Section 6.3.3.4).

Relating local knowledge and experience to national and global perspectives and imperatives

The second relational question: “How is local knowledge and experience situated in relation to national and global perspectives and imperatives?”, is driven by the concern raised in Section 3.4 of local conservatism in which learners’ knowledge becomes limited to what they know and experience. This conservatism can be related to understandings of naïve constructivism in which learners are left to construct their own knowledge without teachers acknowledging the need for the mediation of new knowledge (Moll, 2002 – Section 4.2.3; Dada et al., 2009 – Section 4.5.3). Despite evidence from one of the historical influences in the Schools and Sustainability Course – the NEEP-GET – which called for understanding “issues and risks from local, national and global perspectives” (NEEP-GET, Doc 4 – Section 6.3.3.4), the conservatism reported above was highlighted in a report for one of the prototype

Schools and Sustainability Courses (2002/2003) stating that “sometimes the lesson plan did not progress beyond simply learning about the surroundings” (Doc 7 – Section 6.3.3.1).

Bhaskar’s (1993) notion of concrete singularity can help to develop an understanding of the relationship between the local and the global with the understanding that **concrete singularity** (being expressively veracious and sensitive to local context at 4D), is grounded in **universal** rights and freedoms at a global level (1M), conscious of **processuality** with the understanding that global concerns and interests will manifest in dynamic and changing ways at the local level (2E), and subject to **mediation** within and between the parts and the whole (3L) (adapted from Hartwig, 2007 – Section 4.2.3). This view of concrete universality (constituted by universality, processuality, mediation and concrete singularity) can be useful in environmental learning where “both environmental and educational issues are context-specific in time and space, and seldom amenable to universal solutions” (Janse van Rensburg & Mhoney, 2000: 47 – Section 3.2).

In the Schools and Sustainability Course possibility for exploring these four constituents of concrete universality can be found as follows: Universal rights were raised through reference to the first curriculum principle (which raises concern for human rights, social justice, environmental health and inclusivity – Section 6.4.1.1). Processuality was raised through local enquiries in Learning Unit 2 (Section 6.4.3). Mediation was raised through focusing on the **interrelationship** between the universal rights raised in the first curriculum principle, illustrating environment as constituted by interacting social and ecological mechanisms. These interacting social and ecological mechanisms can also be described as laminated totalities “constituted by several ontologically distinct but interacting mechanisms [and] their relationship of dependency and interdependency” (Bhaskar, 2010: 14 – Section 2.6.3). The Schools and Sustainability Course drew attention to the first curriculum principle, highlighting its role in guiding all curriculum design features, and illuminating how the principle underpins learning area role and purpose, learning outcomes and assessment standards (Section 6.4.1.4). Through this, teachers were oriented towards understanding that approaching the curriculum in a reductionist manner by taking a learning outcome or an assessment standard at ‘face-value’ reduces this key social-ecological understanding at all levels of curriculum. One teacher commented on what an “eye-opener” this was for her (Section 6.4.1.1). Finally, the fourth constituent of concrete universality, concrete singularity, was raised in Learning Unit 2 through supporting direct or indirect actions in small localised school contexts.

Relating local knowledge and experience within a stratified reality

The third relational question: “How is local knowledge and experience related to the structures and mechanisms out of which it is generated?” is important considering the concern raised in Section 6.3.3.3 that a failure to work within a depth ontology (Bhaskar, 1998 – Section 5.2) can lead to the epistemic fallacy or the “hypostatization of thought” as in the Hegelian dialectic (Bhaskar, 1993: 74 – Section 2.6). Data from a Schools and Sustainability Course district workshop illustrates consideration of stratified reality in the discussion that was held about the economic imperative for informal vendors outside the school who made a living from selling unhealthy sweets to learners. The discussion considered the interplay within stratified reality of experiences (illnesses associated with poor diet), events (the daily selling of unhealthy food to children) and generative structures and mechanisms (the informal trading sector in a context of poverty and unemployment). A proposed alternative emerging from the discussion was for healthier foods to be sold in negotiation between learners, sellers and teachers (Section 6.4.2).

An example of a challenge to local conservatism is found in evidence from the Schools and Sustainability Course where the tutor worked with a curriculum interest in “identifying steps to be taken by government to redress historic imbalances and poverty”. She re-interpreted this curriculum interest in the context of a school garden project by highlighting the need to ask “what steps can government make to address poverty and malnutrition” (Section 6.4.6)? This highlights a play between the transformative agenda of the curriculum and the local enquiry imperative of the course, which ironically challenged the existence of the vegetable garden by highlighting that although it may have become a necessity for a school to have a vegetable garden in order to meet critical need in the community, schools should not allow governments to become complacent in expecting schools to provide food for needy children.

Relating local knowledge and experience to tensed socio-spatialising knowledge and experience

The fourth relational question: “How is local knowledge and experience related to tensed socio-spatialising knowledge and experience?” links to one of the constituents of concrete universality listed above – processuality, Bhaskar’s interest in “tensed socio-spatialising process” (Bhaskar, 1993: 160 – Section 2.4) and the presence of the past which “may be present as transfactual or actual, latent or manifest, agential (and, if so, as living or dead)” (Bhaskar, 1993 – Section 2.4). For the cases in this study the continued prevalence of poverty and inequality between places, pre- and post-apartheid times, and racial and socio-economic divides, all strongly influenced by the presence of apartheid past (Section 8.2.1), mean that local experience needs to be related to these spatio-temporalities in order to feed critical

reflections on local context. The interest in tensed socio-spatialising process and an interest in absencing the presence of apartheid past is evident in the RNCS Economic and Management Sciences interest in discussing how to “redress historic imbalances and poverty” (South Africa. Department of Education, 2002c – Section 6.4.6) and couched in the curriculum values reflecting in interest in redress, equality, human rights and democracy (South Africa. Department of Education, 2002h – Section 4.5.1).

A specific form of redress, that is highlighting the value of indigenous knowledge in society, was highlighted during Schools and Sustainability Course portfolio activities. For example, one teacher noted the RNCS Economic and Management Sciences interest to “help to protect natural resources e.g. indigenous plants” (Section 6.4.1.2). This interest in indigenous knowledge is evident in the NEEP-GET call for exploring local and indigenous ways of interacting with the environment as a useful starting point for school-based learning actions (Doc 4 – Section 6.3.3.2), and in ideas for investigations and actions promulgated in the Schools and Sustainability Course, for example, “make a recipe book of food and medicinal recipes using indigenous plants from the area ... interview local community on uses of indigenous plants and changing practices with regard to harvesting and use ... propagate indigenous plants ... restore natural ecosystems to bring back indigenous fauna and flora” (Appendix P).

Summary and implications of this analytic statement

This analytic statement has described how the RNCS curriculum, learning and teaching support materials, and Schools and Sustainability structures and mechanisms had the potential to influence processes of situated learning with respect to relating local knowledge and experiences to abstract school knowledge, to national and global imperatives, to structures and mechanisms underlying their construction, and to tensed socio-spatialising processes. The importance of considering these relational positions was argued as a response to concern for local conservatism and lack of epistemological access in South African schools. These relational positions will become important when discussing how they translate into relational processes for understanding 1M absence and 2E absencing processes (Section 8.2.5).

8.2.4. Analytic Statement 4: A transformative agenda underpinning educational processes does not necessarily ensure reflexive value-based deliberation, informed choice and subsequent transformative praxis.

Introducing the analytic statement

Arising out of the notion of laminated totalities as discussed above are different perspectives and biases that can arise from its complexity. This means needing to ultimately make a judgement call on a way forward; that is, embracing judgemental rationality in the presence of epistemological relativism (Archer et al., 1998 – Section 2.1). It is 3L in the MELD schema that ushers in the affective domain which Hartwig (2007 – Section 2.5) described as “the seat of the moral imagination and optation (e.g. hope), issuing in values and sentiment”. For Bhaskar this is “the spot from which we must act, the axiological moment” (1993 – Section 2.6.3). In environmental education the NEEP-GET research stated that: “In environmental education processes, a strong emphasis is placed on values and attitudes” (Lotz-Sisitka & Raven, 2001 – Section 6.3.3.4), however the project also highlighted that environmental education processes should “avoid values education ... becoming impositional” (Lotz-Sisitka & Raven, 2001 – Section 6.3.3.4). This means that values should not be imposed but deliberated in reflexive processes through “mirroring one’s own ideas, views, values and perspectives with those of others” (Wals, 2009: 385 – Section 3.4). This concurs with 3L in the MELD schema where values and sentiments are communicated at Plane [b] by “transactions with ourselves and others” (Hartwig, 2007 – Section 2.5). This section reflects on the opportunities provided, and approaches to working with values in emergent active learning processes in the context of the national curriculum and Schools and Sustainability Course.

Examining the platform for reflexive value-based deliberation and informed choice

The curriculum learning outcome used by all teachers in at least one of the lesson plans developed for the Schools and Sustainability Course (that of making informed choices in the Life Orientation Learning Area), the Natural Science (Geography) interest in making informed decisions, the Languages and Natural Science interest in problem-solving, and the Economic and Management Science interest in alternative goods and services (Section 7.3), are all dependent on making choices that are morally and practically reasoned. Work in the Schools and Sustainability Course made no attempt to impose values on teachers, but at the same time neglected to work with teachers in how to deal with conflicting values and to come to reasoned choices that stand up to tests of truth and normative judgement (Lotz-Sisitka,

2008; Brown 2009 – Section 3.4). With a critical realist argument for judgemental rationality this can be argued to be an absence of the course that could lead to an inability to act “since how can we act if we cannot choose between better or worse” (Price, 2007 – Section 3.4). The importance of making choices was highlighted by one of the teachers who spoke of the importance of helping learners “to make choices for alternative solutions for sustainable living in a democratic society” (Section 6.4.1.1).

Section 8.2.1 highlights the transformative agenda evident in the RNCS which was infused with the principles and practices of the Constitution of the Republic of South Africa (South Africa. Department of Education, 2002h – Section 4.5.1). This is also evident in curriculum links chosen by teachers participating in the study which made implicit references to human and children’s rights and redress in response to persistent inequality in South Africa; ecological health and responsibilities towards the environment; and participation, democracy and environmental justice (Tables 7.1, 7.2, 7.3, 7.4, 7.9, 7.11, 7.16 and 7.17).

The strong interest in human rights, redress, equality and democracy underpinning the curriculum is perhaps a reason why there was not much evidence (in the explicit, implicit and null curriculum analysis conducted in Chapter 7 of curriculum links chosen by the teachers) of cases where values with Power2 (Bhaskar, 1993 – Section 2.5) influence were promulgated. One case was identified (through the explicit, implicit and null interpretation of the curriculum links chosen by teachers participating in the study) where there was a possible tension between this transformative agenda and the role and purpose explicated in the curriculum. This was the case of the Economic and Management Sciences Learning Area where Power2 relations were implied, thus standing in contrast to the transformative intent of the curriculum. For example, the learning area emphasised economic (albeit sustainable) growth, and financial (above ecological) rationales for sustainability practices without consideration that economic growth has increased demand on limited resources (United Nations Environment Programme, 2007) or consideration that open markets and profitability may inhibit human rights and environmental health (Table 7.1). This promotion of sustainable growth is illustrative of Utopianist or reified applications of sustainable development (Jickling, 1992; Lotz-Sisitka, 2008 – Section 3.4) and of a failure to examine the shaping influences and practical adequacy of normative frameworks (Lotz-Sisitka & Schudel, 2006 – Section 3.4).

In another case of reification, an interest in recycling was assumed to be ‘good’ – thus implying an imposition of values not necessarily appropriate considering that recycling also has particular environmental impacts (transport and re-manufacturing). Another problem is an

over-emphasis on recycling with no reference to ‘reduction’ (the fourth ‘R’ in the well-known ‘reduce, re-use, recycle’ mantra of environmentalists) in the curriculum (as highlighted in Table 7.1). In the case of the Economic and Management Sciences Learning Area which “questions consumerism while respecting basic human needs and need for equality; and at the same time respecting resource limits” (Table 7.1), the Life Orientation interest in recycling was extended to include re-use. But a potential contradiction arises when it neglects to explicitly consider reduction as a third option despite drawing attention to “unlimited needs and wants in the face of limited resources” (Table 7.1). It could be argued that limiting waste management options by focusing on recycling and re-use, runs the risk of neglecting the question of the difference between needs and wants which highlights the issue of over-consumption, and can indirectly teach learners to be consumers of waste while ‘glorifying waste’ in the process. The emphasis on recycling and re-use also can be considered critically in the light of Bhaskar’s insistence that judgements need to be “morally universalisable” (Hartwig, 2007 – Section 2.6.3) and Lotz-Sisitka, Fien and Ketlhoilwe (Lotz-Sisitka, Fien, & Ketlhoilwe, 2012 - forthcoming: 7) that “not everything can be rationally controlled through pedagogy and/or scientific thought”. In South Africa a growing number of people, faced with few alternatives, are turning to reclaiming garbage.

Street reclaimers, together with their counterparts who sort through the ever growing heaps of waste at municipal landfills have found that by turning garbage back into commodities they have created an innovative way to support themselves and their families within a context where few can hope to find a job. (Samson, 2009: 1)

Curriculum work should be committed to supporting a Constitutional imperative to “improve the quality of life of all citizens and free the potential of each person” (South Africa. Department of Education, 2002j – Section 4.5.1). This is reminiscent of the 3L imperative to search for a eudaimonistic society in which “the theory of possibility of a planetary society of unity-in-diversity in which the free flourishing of each is a condition of the free flourishing of all” (Hartwig, 2007: 157 – Section 2.2). Thus, it is important, when working with learners from an impoverished community who might experience similar conditions to those described by Samson above, to ask questions such as “Who is recycling? Why are they recycling? Under what conditions? How can these conditions be improved?” This is to mitigate against creating the assumption that this activity is a prescribed career choice for a particular socio-economic group.

Summary and implications of analytic statement

The above examples illustrate that the RNCS curriculum and Schools and Sustainability Course structures and mechanisms introduced value concerns regarding environmental issue

and risk, but did not provide much guidance on how to find a way forward for “holistically totalizing intentional change” (Bhaskar, 1993: 176 – Section 2.2). Considering that 4D>3L>2E>1M (Hartwig, 2007 – Section 2.6.5), value-based reflexivity at 3L is integral to 4D transformative agency and thus teaching and learning activities that do not support reflexive value-based deliberations and informed choice may have limited potential for supporting transformative praxis. This discussion has illustrated that a transformative agenda underpinning educational processes does not necessarily ensure reflexive value-based deliberation in practice and hence does not ensure that active learning processes emerging from this context will manifest as transformative praxis. This limitation on the potential for value-based reflexivity and informed choice will be related to emergent active learning processes at 3L in the MELD schema (Section 8.2.6). This discussion has elaborated on the interest in an iterative relationship between learning and doing as identified in Section 8.2.2, highlighting that learning is not only about ‘relating’ ideas or theories in different ways (Section 8.2.3) but also about making value-based choices for better, more ethically constituted, practice.

8.2.5 Analytic Statement 5: Relational situated learning processes enabled a developing understanding of the nature of environmental issues and their associated absences

Introducing the analytic statement

Section 2.3 highlighted how “transformative praxis is about “absenting the given (and typically driven by and against absence)” (Bhaskar, 1993: 152 – Section 2.3). This section discusses how teachers mobilised opportunities for investigative enquiry by designing lesson plans with a relational approach to situated learning as described in Section 8.2.3 and how some of these investigations resulted in a description of the nature of environmental issues and how others contributed to deepening understanding of environmental issues from the perspective of ‘absence’. Firstly instances are discussed where environmental issues are investigated in terms of their nature (that is in terms of understanding local knowledge and experience) and how these understandings are elaborated through relating to school knowledge (of varying degrees of abstraction). Secondly instances are presented where situated processes relate local knowledge and experience to a depth understanding of absence, to absence from national perspectives (global perspectives are not evident in the data), and to absence from tensed socio-spatialising perspectives (Bhaskar, 1993 – Section 2.4). These instances also include discussion on how classroom activities resonating with the first curriculum principle – “awareness of the relationship between human rights, social justice,

environmental health and inclusivity” (South Africa. Department of Education, 2002j: 10 – Section 1.3) – can enable an understanding of complex laminated totalities (Bhaskar, 2010 – Section 6.2.3). In a third section contingencies on understanding issues and associated absences are discussed.

Linking local knowledge and experience to school knowledge

The first instance of an investigation into the nature of environmental issues is Nokhanyo who, working within the Life Orientation Learning Area was expected to help learners link recycling to environmental health (Table 7.1). Beyond this explicit expectation, the curriculum elaborated no content knowledge in terms of understanding the social-ecological complexities of waste management, for example the effects that different products such as tins, glass and paper have at different stages in their life cycles (from ‘cradle-to-grave’), or the complexities of recycling and waste management as part of the green economy. Thus Nokhanyo’s ability to elaborate on this opportunity for understanding the nature of waste was contingent on her being able to elaborate an understanding of the effects of waste through knowledge sourced either from her own knowledge or elsewhere. She related litter to the spread of ‘germs’ which are harboured in unmanaged waste and linked paper recycling to saving trees (Section 7.2.1.4). Noteworthy, though, is the need for scientific rigour in understanding complex processes more fully. The argument against litter was taken further with the implications that tuberculosis is one of the germs spread through litter (Section 6.4.2). A translation of the Xhosa word for tuberculosis “isipho sepepha” (the disease of paper) indicates how a link could be made between litter and the disease, even though this is not directly the case – tuberculosis is an airborne disease connected to a weakened immune system.

Table 7.1 notes how the Geography learning outcome concerned with exploring issues does not elaborate on what makes an issue an issue. Nokhanyo elaborated on this null aspect of the curriculum document by drawing on a textbook worksheet comparing a landfill and informal site based on adult supervision, proximity of houses, fencing, animals on site and protective clothing (PLATE 1, Photograph 2). In this way risks were implied but still not made explicit. However, the worksheet failed to guide learners to make meaning of their observations (what the implications of the states of the respective sites were), thus failing to draw the enquiry process to a point where a judgement could be made about the state of either site. This can be seen as an example of naïve constructivism (Moll, 2002 – Section 4.2.3) where learners construct what they see from their own experience, but are not challenged to make sense of it or relate it to school knowledge or new knowledge. Learners knew, for example, that there

were flies, rats, mice and birds at the informal dumpsite, but were not challenged (by the worksheet or the teacher) as to what this meant and whether this was a favourable or unfavourable situation and why. Although there is no evidence in her portfolio, it could be that Nokhanyo elaborated on the implications verbally in classroom discussion, as Weliwe did when she noted a link between flies and rats and disease and noted the health hazards associated with playing on a dump site (Section 7.2.2.4).

Other instances where the nature of issues were explored were Nomhle and Nomonde's explorations of eating habits in learners' homes drawing on explicit curriculum investigative skills from two learning areas. These skills included: investigate, collect data, solve problems (Natural Sciences); and collect, sort, describe, construct pictographs, and interpret data (Mathematics). From a graph combining this data Nomonde and her learners had access to information that more than half the class was eating two or less meals per day, nearly half of the class was not receiving breakfast on school mornings, about a quarter of the class was only eating from one food group in their meals, and just over half of the class had vegetable gardens at home (Section 7.2.3.4).

Nomhle's investigation made use of a colourful graphic which was constructed in a co-engaged manner with the class as a group. Later she asked learners to transfer this into smaller individual pictographs (Section 7.2.4.4), thus developing the curriculum interest in data representation skills. From this activity Nomhle noted that three learners had not received food at home for breakfast or lunch for three days (Section 7.2.4.4).

Nomhle and Nomonde linked their local investigations to school knowledge guided by the explicit curriculum interest (Life Orientation) in 'identifying nutritious choices from a range of commonly available foods and drinks' (Table 7.7 and 7.9). They elaborated on this curriculum interest by focusing on the distinction between healthy and unhealthy food, the importance of different food groups (including the value of variety within food groups such as vegetables), the value of a balanced meal, and the relative amounts of different foods that one should have in a meal. Nokhanyo's lesson plan focused on how to make compost which she linked to abstract school knowledge regarding the recycling of organic matter and the ecological value of compost as nature's own fertiliser (Sections 7.2.1.4. and 7.2.2.4).

In a different way of relating local to school knowledge, Mhizana invited parents to the school to talk about wild vegetables that could be eaten and to share recipes with learners. She related these wild vegetables to school knowledge by showing learners how wild vegetables

related to a food group poster, and by elaborating on the health benefits of fresh and indigenous vegetables (Section 7.2.5.4).

Another qualitative enquiry involved a specific focus on working with similarities and differences as a ‘thinking and reasoning’ skill in Home Languages (Table 7.11). Nomhle elaborated on this curriculum opportunity by developing visual materials (comparative photographs) for learners to compare the quality of different gardens in the school. From this learners were able to highlight the need to compost, weed, water and intercrop in the garden (Section 7.2.3.4). Even though this was not explicated by Nomhle, this would have been usefully linked to the Natural Sciences Foundation Phase school knowledge of the basic requirements for plants that “have needs similar to ours, for food, water and air” (South Africa. Department of Education, 2002g: 62).

Focusing on the Social Science (Geography) curriculum interest in exploring environmental issues, Zodwa addressed water access and sanitation in her school. She elaborated on the issues by designing qualitative and quantitative observations of water waste hot spots in the school, and a detailed audit of plumbing and sanitation infrastructure in the school. She also designed an activity for learners to measure water lost from leaking taps (Section 7.2.6.3). Through these investigations on the nature of water and sanitation issues, she was able to link to school knowledge through the Geography curriculum interest in identifying “one or more pollution issues in a particular context” (Table 7.15) (in this case she linked pollution to the sanitation problems and the pollution – water stagnation – caused by leaking taps), the Mathematics interest in ‘measurement’ (Table 7.16), and the explicit Geography curriculum interest in the sources of water (Table 7.17).

Linking local knowledge and experience to a depth understanding of absence, to absence from national and global perspectives, and to absence from the perspective of tensed socio-spatialising realities

The first section focused on investigations that elaborated on the nature of environmental issues. This section focuses on how these understandings can be elaborated through understanding absences at different stratifications of reality, from a national perspective, and as tensed socio-spatialising processes.

Weliwe’s lessons provide the first example of an instance of **deepening knowledge of reality**. She drew attention to a generative mechanism – the South African Waste Act whose powers existed unexercised (Archer, 1998a – Section 5.2) as was evident in litter in and around the school. By drawing attention to the absence of systemic structures (bins to manage

waste) she added the notion of contingency (ibid.) to deepen understanding of the perception that people do not care, do not want to take responsibility, or are lazy; by highlighting the contingency of responsible action on appropriate systemic support. This can be related to Section 3.3.4 which highlights that ‘environmental problems are not only solved by decisions made by individuals but by addressing systemic structures of society’. In cases where people were still littering despite the presence of bins, she drew attention to the normative framework of the South African Waste Act that outlined personal rights and responsibilities with respect to waste as well as the responsibilities of structures such as municipalities or schools to provide waste management services (Section 7.2.2.4). This example shows the elaboration of understanding of absences not only in terms of deepening understandings of reality but also in terms of **broadening understanding to a national level** with an emphasis on a search for **universal** rights and freedoms in a quest for concrete universality (Hartwig: 2007 – Section 4.2.3).

In another instance, Nokhanyo’s learners explored litter in a land pollution worksheet (PLATE 1, Photograph 3). The emphasis (in a completed learner’s worksheet) on the nature (types of litter) rather than the causes (limited to who or what littered rather than why they littered) of litter (Section 7.2.1.4) indicates that the root causes of litter were not clear because of an exploration limited to (albeit important) descriptive knowledge of the nature of the issue without following with knowledge of root absences and absencing processes — how the situation came to be. Related to critical realism, this means a focus on the empirical **without looking to structures and mechanisms in the realm of the real** (Archer, 1998a – Section 5.2).

An activity in the Schools and Sustainability Course where teachers related their curriculum work to the RNCS first principle (Section 8.2.3) has resonance with the way that social-ecological issues were discussed regarding a waste management issue highlighted in Weliwe’s and Nokhanyo’s cases, that is the burning of waste. Both teachers argued that the burning of waste can be related to ill health (particularly asthma and other lung problems and aggravating tuberculosis) and Weliwe argued that burning grass instead of using it for mulch was ‘fighting nature’, while her colleagues wanted to burn grass for fear of snakes (Section 7.2.2.4). This reflects an example of exploring **social-ecological complexities of laminated totalities** and the type of mediation needed in the quest for concrete universality (Hartwig: 2007 – Section 4.2.3).

In another lesson plan aimed at **deepening knowledge of reality**, Nomhle extended learners’ investigations into what was eaten by whom (as described above) to qualitative, descriptive

enquiries guided by the Social Science (Geography) curriculum's explicit interest in the skills of identifying and describing issues. With the challenge of no explicit curriculum input on when personal health (in this case related to nutrition) becomes an issue (Table 7.9), Nomhle needed to elaborate on her understanding of nutrition issues in order to facilitate a discussion. For example, the questions she asked about the regularity, quantity, and quality of learners' meals at home deepened by questions such as who provided the food and what contingencies were in place if there was no food (Section 7.2.4.3), illustrates her elaboration of the food security issue as related to absences associated with poverty (absence of money), unemployment (absence of work) and child and grandparent headed households (absence of parents). By relating food insecurity to an absence of mechanisms in order to ensure the rights to food as legislated in the South African Bill of Rights (Section 7.2.4.3), Nomhle **broadened understanding of food insecurity to a national level** with an emphasis on a search for **universal** rights and freedoms in a quest for concrete universality (Hartwig: 2007 – Section 4.2.3).

In another qualitative study, Mhizana elaborated on Home Language and Social Science (History) investigative skills when learners were expected to explore, ask questions, offer explanations, and offer solutions (Tables 7.13 and 7.14). Here, critical questions were posed to groups of learners such as how they would access nutritious food if they had no money (thus addressing the question of absence of financial security in relation to the issue of nutrition). She followed this question with an activity where learners were expected to gather information at home about food eaten in the past with the idea of using indigenous vegetables to supplement diets. On another occasion a parent was invited to share information about indigenous vegetables during an investigation in the school grounds. This illustrates the relation of local knowledge of learners to the indigenous knowledge of parents. In this was she was addressing **tensed socio-spatialising processes** with respect to loss of indigenous knowledge over time, and loss of access to indigenous plants as wild 'space' was replaced with vegetable gardens growing 'popular' vegetables of the day. Also, she was pinpointing the "real, but non-actualised, possibilities inherent in a situation, thus inspiring grounded hope to inform emancipatory praxis" (Bhaskar, 1998b: 112 – Section 4.2.3).

In another example of relating curriculum work to the RNCS first principle, the three teachers focusing on nutrition all wrote their own rights-based stories as a teaching strategy for sharing the social-ecological complexities of food insecurity (highlighting poverty, inaccessibility of social grants and absent parents – or single parents too pre-occupied to focus on their children's needs). Through this, learners were introduced to understanding of the dangers associated with the absence of a healthy and balanced diet, their rights to not be subjected to

these absences, and the **social-ecological complexities of the laminated totalities** that can contribute to food insecurity.

In a final example of exploring **depth understandings of absence and absencing processes**, Zodwa and her learners discussed reasons for damage, effects of damage and implications of this for their health and education (going home early because of lack of sanitation facilities). This was followed by an interview with educators and school governing body members to explore the reasons for inadequate water and sanitation in more detail – thus broadening understanding of the problem as not only about theft and vandalism but also about poor construction, poor planning and overcrowding. Zodwa’s measurement of water waste activities and identification of hot spots with her learners was related to water scarcity in South Africa (7.2.6.3) thus illustrating how she **broadened understanding of water access to a national level** and highlighted how national issues manifest in particular ways at the local level – thus illustrating an interest in processuality which is important in a quest for concrete universality (Hartwig: 2007 – Section 4.2.3).

Contingencies on investigations for understanding the nature of environmental issues and relational features of their associated absences and absencing processes

Key contingencies on the ability of learners to conduct meaningful enquiries are a foundational grasp of literacy and numeracy without which critical engagement is not possible. In South Africa, with literacy (even in home language) a problem (Rosenberg et al., 2009 – Section 4.6.2), and low levels of literacy and numeracy in national and international tests (South Africa. Department of Basic Education, 2011b – Section 1.4 and Taylor, Fleisch, & Shindler, 2007 – Section 1.4), questions could be raised about the confidence of young learners to speak to adults in their community, especially in controversial situations and to be able to report back meaningful findings in the classroom situation. The enquiries described above grew out of creative learning and teaching strategies employed by teachers in these cases. Examples include Nomonde’s household questionnaire on eating habits – with creative use of ‘tick-box’ options for young Grade 1 learners and rigorous rehearsal to scaffold an activity which was a new data collection skill for young learners (Section 7.2.3.3).

Nomhle, Nomonde and Zodwa’s investigations employed mathematical measurements and representations conducted in non-threatening and meaningful ways (such as measuring a dripping tap or creating pictographs directly related to direct concerns of learners) (Sections 7.2.3.3, 7.2.4.3 and 7.2.6.3). In other cases scaffolded feedback activities were designed where learners were asked to report their findings orally and then asked to write sentences about what they had found out (see compost enquiry in Section 7.2.1.3 and water and community enquiry in Section 7.2.6.3). Weliwe, in deference to the difficulty her learners had

with writing in English, scaffolded their language learning by asking them to answer orally in English while she wrote down their answers for assessment purposes. For Nokhanyo, using a written observation sheet (comparing formal and informal dumpsites) was a new teaching method (Section 7.2.1.4) which challenged her learners to read and write in English. Mhizana reported the empowerment experienced by learners when they conducted an interview with their parents (Section 7.2.5.4). Zodwa successfully engaged learners in interviews and letter-writing (a form of feedback on enquiries, but also an indirect action responding to the problem) even in a situation fraught with controversy over vandalism and crime. Besides a water waste hot spot worksheet copied for learners, Zodwa designed all her own investigations, thus indicating competence in the role of designer of learning programmes (Section 4.3.3).

However, there were three cases where the mathematical and scientific rigour of investigations was questionable. In the first case, when Nomhle's learners constructed individual graphs of eating habits at home, the graph construction was accompanied by questions expecting learners to decide whether "the diet above is balanced" (PLATE 15, Photograph 54). Section 7.2.4 points out that this question is problematic because the question of balance cannot be asked of a group, but needs to be asked of an individual. Both learners whose work was presented in Nomhle's portfolio struggled with the question, with both giving inappropriate answers based on collective data about the group's diet – thus leading to a conclusion that as a group there was a sufficient variety of food eaten. However, this detracted from the interest in whether there were individuals in the group that were not eating a balanced diet (Section 7.2.4.4). In Zodwa's case, the rigour of graph interpretation seemed compromised by ambiguity in learners' work regarding whether water was 'wasted' because of damaged taps or 'wasted' because they had not collected the water from the dripping taps to use in the gardens (Section 7.2.6.4).

A discussion between Weliwe and the course tutor commended the visual representation of waste volumes (Plate 7, Photograph 27), but in another example where investigations were questionable, the tutor suggested that learners could measure the amount of waste and represent it graphically with more mathematical accuracy (Section 6.4.3).

These two examples illustrate that self-designed studies are advantageous in that they can develop an insightful picture into the nature of local environmental issues and risks and provide depth understandings of associated absences and absencing processes. They are, however, contingent on knowledge and experience in scientific and mathematical methods on

the part of the teacher in order to support learners to gather and interpret information in a meaningful way.

Summary and implications of analytic statement

The discussion above provides examples of situated learning processes that relate local knowledge to school knowledge, thus highlighting how emergent active learning processes can strengthen understanding of curriculum concepts. Examples of significant school knowledge from the above include recycling (organic in the case of composting and inorganic in the case of paper and other waste products), environmental and personal health, a balanced diet, healthy (including indigenous vegetables) and unhealthy food, what plants need to grow, and life cycle analysis (not explicit but implied in the argument that trees are saved thorough recycling paper). These concepts can be linked to five of the important foundational concepts for learning identified by Lotz (1996 – Section 4.5.3). For example understanding recycling is important for “understanding the patterns of change”, understanding the link between personal and environmental health and understanding what plants need to grow are important for “discovering how living things fit into their surroundings” and “interrelationship and interdependence”, life cycle analysis contributes to understanding “cause and consequence”, and the notion of a balanced diet and the value of indigenous vegetables contributes to understanding “diversity”.

The discussion above also highlights situated learning that related local knowledge and experience to a deep understanding of absence and absencing processes. This interest in depth understanding relates to concerns raised in South African curriculum implementation that knowledge is poorly presented in terms of progression and depth (Dada et al., 2009: 24 – Section 1.3; Section 4.5.4). This understanding can be related to the 2E process of uncovering the “alethic truth of falsity” (Bhaskar, 1993 – Section 2.6.3), “concerning how people live, for example under structures that alienate them, and the beliefs those structures engender” (Norrie, 2010: 130 – Section 2.6.2). The significance of this depth analysis of absence is highlighted by O’Donoghue’s (2007: 153 – Section 3.4) suggestion that “practice-based deliberations ... might allow the better mediation of choices that are more reality congruent and socially responsible”. This links with an interest in developing a unity of theory and practice which is important on the pathway to transformative praxis.

Furthermore the section considers absences elaborated through relating local knowledge and experience to national (waste and human rights) policy, the national situation of water scarcity in South Africa, and the tensed socio-spatial processes of exploring the historical uses of food.

8.2.6 Analytic Statement 6: Value-based reflexive deliberations influenced the development of the capacity for making informed choices in emergent active learning processes.

Introducing the analytic statement

Section 8.2.4 highlighted how the RNCS curriculum and Schools and Sustainability structures and mechanisms introduced value concerns regarding environmental issue and risk, but did not provide much guidance on how to find a way forward within and amongst ethical dilemmas – that is for how teachers should engage learners in reflexive value-based deliberation towards informed choice. This section reflects firstly on false beliefs, frustrated needs and contradictions that were highlighted through the active learning processes emergent from the six teachers' engagement with the Schools and Sustainability Course. This is in the context of the complex laminated totalities described in the previous section (Section 8.2.5). Also the section considers how, despite limited guidance from the curriculum and Schools and Sustainability Course (Section 8.2.4), the teachers' influenced and enabled deliberations and informed choice through their teaching methods and strategies.

This section is concerned with 3L reflection on totality (Section 2.6.3); the dimension of change that represents the axiological moment (Bhaskar, 1993 – Section 2.6.3) entailing a search for reality congruent (grounded in the knowledge of 1M possibility), reasoned (informed by 2E understanding of absence and absencing processes), and reflexive value-based deliberations relating to informed choice (informed by the 3L consideration of the holistic whole and an interest in “holistically totalizing intentional change” (Bhaskar, 1993 – Section 2.2). This 3E component of the MELD schema incorporates the 1M and 2E components as well.

Highlighting false beliefs, frustrated needs and contradictions in the context of complex laminated totalities

It is in the process of value-based reflexive deliberations that difficulties arise in making an informed choice. Examples from the active learning processes emergent from the Schools and Sustainability Course, are presented in the discussion below. These example illustrate the difficulty of making an informed choice about the “nature of the good” (Sayer, 2000: 159 – Section 5.2) and highlight cases where an understanding of “false beliefs and frustrated needs” (ibid.) helped, or could have helped, in the making of informed choices.

The value of recycling can be argued in that it can reduce environmental impact at the point of the extraction of raw materials and at the point of disposal either as litter or in a formal or informal dumpsite. However Section 8.2.4 points out that recycling still involves a re-manufacturing process and its carbon footprint is relative to the distance recycled and remanufactured items are transported. In some cases reduction might be a more pressing imperative than recycling. This raises the need for reasoned arguments dealing with ‘relative goodness’. Weliwe provided evidence of challenging assumptions about the nature of the good when she pointed out the value of re-use with her learners by arguing that using the bins instead of littering means that waste still needs to be burned or buried, thus transferring the problem from one place to another (Section 7.2.2.4). By challenging assumptions about the nature of the good, Weliwe was helping learners to make an informed choice based on a challenge to a **false assumption/belief** that picking up litter was the best (or only) available choice to improve waste management in the school.

In another complex decision-making process, Nokhanyo made fireballs with her learners inspired by the Economic and Management Sciences interest in “alternative goods and services as a way to economise and save” (Table 7.2). This activity was particularly fitting for this learning area, but a contradiction becomes apparent with Nokhanyo’s point (linked to the Life Orientation interest in “informed decisions regarding personal, community and environmental health” – Table 7.3) about the implications of burning waste for “lung problems, chest problems, negative affect on TB patients, asthma” (Section 7.2.1.4). Although this contradiction was not raised in the classroom, this would be a challenging activity for learners to reflect on the tensions created by the need for waste reduction, the need for fuel in the context of poverty, and the concern regarding personal health, and to find a way forward that was appropriate from a social-ecological perspective for both personal and environmental health. This example relates to Sayer’s question above regarding “what are the **frustrated needs?**” In this case an absence of money and fuel are frustrated needs in the community. In Weliwe’s case, she was not able to address these particular needs, but found a useful way to use waste paper by creating balls for younger learners to play with, thus addressing another frustrated need in poorly resourced schools, namely physical equipment for younger learners. In a third, waste related case of frustrated needs, Nokhanyo had the problem of needing to decide whether to burn the waste in her school (and contribute to air pollution and lung complaints) or to try to manage the waste in hole (where it is open to scavenging animals and susceptible to being blown about by the wind – Section 7.2.1.1). Even though she had found a potential solution for reducing waste through recycling, this solution was frustrated by a lack of a recycling system in the nearby town so that in 2009, she

was still sitting with paper waste in her classroom that had been collected in 2008 (Section 7.2.1.4).

A **contradiction** arose in Weliwe's case when she raised the concern that by burning grass they were 'fighting nature' while her colleagues wanted it burned because of fear of snakes. Ultimately she argued that by using grass for mulching they would be able to improve the soil and hence productivity in their vegetable garden (Section 7.2.2.4). This case is illustrative of Bhaskar's description of dialectic "essentially involving contradiction, and as a dynamo of conceptual and social change" (1993: 175 – Section 2.2). In keeping with Bhaskar's further elaboration of dialectic as being driven by absence (ibid.), this example can be explained by two absences – ecosystem health and children's safety. In this case, the school, as a collective, was able to make an **informed choice that addressed both of these absences**.

In another case where the human-environment relationship was brought to the fore, one of Weliwe's learners insisted on saving a praying mantis from being killed from his fellow learners. It is not clear why the children wanted to kill the insect, but it can be speculated that this was driven either by a **false belief** that this insect can be harmful to people or by **frustrated needs** with young children needing to release feelings of anger or violence by harming other creatures.

The teachers focusing on food security also raised a problem of **contradiction between school knowledge and real possibility** in the home environment. Nomhle noted a concern that teaching about healthy eating might be ineffective if parents are unable to provide learners with anything different (Section 7.2.4.4). Mhizana asked the same (Section 7.2.5.4). Considering the levels of poverty in the community, Nomhle discussed the question of the costs of food in class, thus highlighting that not everyone can afford to buy healthy food (Section 7.2.4.4). In another contradictory situation, although Nomonde tried to grow a vegetable garden to supplement the school feeding scheme, the garden struggled due to environmental conditions such as drought and soil degradation. This ushered in a conversation of the difficulty of teaching learners what they should eat, when there were limitations on possibilities for what they could eat (Section 7.2.3.4). Thus, in the context of these **frustrated needs**, the ideal of growing food is dependent on either the real possibility of parents being able to buy food or the real possibility of growing vegetables for those in need.

An additional complexity is raised by teachers working with the question of diet and nutrition was the question of personal choice. For example Nomonde pointed out that, even if children know what is healthy to eat, they will choose sweets over a healthy apple (Section 7.2.3.4).

The **contradictions** here are not clear without further investigation, regarding whether this phenomenon is a question of sugar dependency, habit, media influence, or simply taste preference. However this point does highlight that there are potential Power2 relations, such as the “control” exerted by sugar (in a biological sense) or “exploitation and control” by the media (in a socialising sense), on children’s choices (Hartwig, 2007 – Section 2.5).

In all cases learners were faced with **contradictions** founded in knowing their rights, but **frustrated** firstly by an inability for laws such as the South African Waste Act and the South African Bill of Rights and interventions such as the child support grant and the school feeding scheme to ensure their safety, and access to a clean environment, water and a healthy diet; and secondly by a context of poverty and inequality. Zodwa’s learners were confronted with a problem of theft and vandalism (symptoms of poverty), and poor construction, poor planning and overcrowding (symptoms of unequal distribution of resources) which were putting pressure on and contributing to the destruction of water and sanitation infrastructure.

Contingencies on making informed choices through value-based reflexive deliberation

In her first lesson plan, Nokhanyo used a worksheet extracted from a textbook where learners were asked to make an unjustified judgement on whether litter is ‘good or bad’ (Section 7.2.1.4), thus implying an intention in the worksheet of values inculcation. Even though the desirability of litter is not necessarily a contentious subject (there is no strong argument why litter might be desirable), this example highlights that learning and teaching support materials that can stimulate more critical reflections amongst learners are needed in order to develop the capacity for reasoned decision-making with respect to value judgements, thus developing the capacity for judgemental rationality in the face of judgemental relativism in more complex decision-making processes (Archer et al., 1998 – Section 2.1; Sayer, 2000 – Section 3.4; Hartwig, 2007 – Section 5.2).

Teachers employed different teaching methods which highlighted and responded to the false beliefs, frustrated needs and contradictions raised above. All teachers used a rights-based discourse (rights of children to health – considering the effects of litter, smoke from burning rubbish, inadequate nutrition, and the inaccessibility of water and sanitation infrastructure on human health) and a citizenship discourse (the responsibility of all to know and abide by waste regulation as stipulated in national policy and the responsibility of all to conserve water) as foundational knowledge to inform the transformative interest of their lesson plans.

Two examples follow: Using rights-based and citizenship discourse, Weliwe argued that learners should pick up litter regardless of who dropped it. Zodwa’s learners signed a pledge

(from a textbook) to conserve water and biodiversity – this opened up discussion about how they could respond in practice (Section 7.2.6.4). She also used scientific argument about the value of water which she developed into a discussion about the responsibility to turn off taps regardless of who left them on. She noted learners reporting incidences of carelessness (leaving taps open) to her (Section 7.2.6.4).

Summary and implications of analytic statement

The introduction to this analytic statement reintroduced an understanding of dialectic as being concerned with contradiction and a “dynamo of social change” (re-introduced above). This can be compared with Wals’s interest in “dissonance created by introducing new knowledge, alternative values and ways of looking at the world [to] become a stimulating force for learning, creativity and change” (2007 – Section 3.4).

Understanding of contradiction and dissonance can be gained by drawing on Bhaskar explanation of processes emerging from interactions within the “social cube” creating a “nexus of competing and antagonistic ideologies” (1993: 161 – Section 2.5). At 3L in the MELD schema (the concern in this section) this includes Power2 relations as well as communicative and moral relations at Plane [b] in the social cube (ibid.). For example, the issue of food security includes questions regarding Power2 relations where the media potential to exert control and exploitation over children’s food choice, might contradict moral relations where children are informed of their right to a healthy diet. In Weliwe’s case, fear of snakes (and insects as has been speculated in the case of the praying mantis) lead to **Power2** relations of people wanting to kill or destroy the homes of creatures, which clashed with Weliwe and one her learners’ belief that there was a **moral** imperative to protect these creatures. The **communicative** relations that took place in the school where mulching was proposed instead of burning grass and where the praying mantis was taken outside, resulted in these cases in resolution of the problem.

Dialectic is a processual and social activity which can be related to Wals’s description of social learning as a process of “mirroring one’s own ideas, views, values and perspectives with those of others” (Wals, 2009: 385 – Section 3.4; Section 8.2.4). This view of learning gives us a sense of how dialectic dynamo is powered and also highlights that change is a social process of ‘working with others’. The social and contested nature of knowledge requires us to consider the role of deliberative co-engagement (by and amongst individuals in social spaces) in emergent active learning processes. The notion of deliberation is key to ensuring that participatory processes are not simply focused on cooperation and solidarity and “apparent movement” (Lotz-Sisitka & O’Donoghue, 2008 – Section 3.3.3) but processes

where people come to “recognize, evaluate and, when needed, potentially transcend or break with existing social norms, group thinking and personal biases” (Wals, 2007b – Section 3.4) and come to new ways of “being and seeing” (Wals, 2009: 385 – Section 3.4).

In the case where learners developed new ways of ‘seeing’, but not necessarily ‘being’, such as the case with Nomonde’s learners who were unable to change their diet, an understanding of the contradictions that arise between school knowledge and real possibility, can help to explain the situation. This can be related to Bhaskar’s call for “concrete utopianism” at 3L which consists “in the exercise of constructing models of alternative ways of living on the basis of some assumed set of resources” (1993 – Section 2.6.3), implying that transformative praxis is contingent on a process of grounding reflexive value-based deliberations at 3L in 1M considerations of real possibility. This section has highlighted some ways in which teachers have engaged learners in such reflexive value-based deliberations, for example through rights and citizenship discourse and through engaging learners in a policy process.

8.2.7 Analytic Statement 7: Action projects in emergent active learning processes can enable transformative agency, and transformative praxis through supporting the unity of theory and practice in practice.

Introducing the analytic statement

Section 2.6.4 interpreted Bhaskar’s (1993: 9) definition of transformative agency as representing “active and reflexive engagement within the world in which we seek to achieve the unity of theory and practice in *practice*” thus implying that transformative praxis is more than just theorising the best way forward, but needs to be implemented in practice. Practice here is related to action within the expressive (including speech action) and performative (the arena of practical action, ergonic efficiency and phronesis) domains (Hartwig, 2007 – Section 2.6.4) and includes both indirect action and direct action as described by Jensen and Schnack (1997 – Section 3.3). Section 2.6.4 described Bhaskar’s (1993: 13) insistence that “4D consists not in practical reasoning but in (reasonable) practice”. This section will discuss the 4D transformative agency within the active learning processes emerging from teachers’ engagement with the Schools and Sustainability Course focusing on the reasonableness of the transformative agency in terms of the actions’ relation to 1M real possibility, 2E understandings of absences and absencing, and 3L value-based reflexive deliberations as elaborated in previous sections. Section 8.2 has already summarised the individual cases in terms of the MELD schema. This section will add more detail based on the 1M, 2E and 3L relations discussed in Sections 8.2.1 – 8.2.6 and discuss transformative agency in terms of the

respective actions conducted by teachers and learners. Change has been discussed in terms of “dialectical and entropic types of change, together with various forms of stasis or reproduction” and “evolutionary and revolutionary” change (Bhaskar, 2010: 14 – Section 2.6.2). For the purposes of this discussion I have interpreted evolutionary change as potential for slow change over time or a temporary measure that needs to be replaced by further change cutting closer to the core problem and revolutionary as quick, sure and distinctly evidential change. Entropic change has been interpreted as change that adds to the complexity of laminated totalities and dialectic change has been interpreted as change grounded in 1M possibility, 2E understandings of absence and 3L value-based reflexive deliberations taking cognisance of laminated totalities. A discussion follows of transformative agency in each of the three themes chosen by teachers, namely waste management, food security and water and sanitation respectively.

Transformative agency in waste management

Recycling by mulching and making compost (Sections 7.2.1.3, 7.2.2.3 and 7.2.4.3). These two actions were concretely grounded in that they were small scale, and linked to the curriculum requirement for participating in a recycling project (1M). They were responding to absences of waste management structures and systems (waste was kept in pits in the respective schools before being burned), food, healthy soil to grow food, and health. The actions were reasoned as a way of reducing waste which would otherwise be burned and contribute to respiratory diseases in the community, and with the knowledge of mulching and composting as a natural recycling process which could absent lack of nutrients in soil. Even though this was not covered in the cases presented, reasoned arguments for mulch and compost could have been extended to understanding of how the actions could improve soil through water retention and soil aeration (2E). These actions were determined by value-based deliberations that were concerned both with the safety of children and avoiding a situation of ‘fighting nature’ (3L).

With grounding in 1M, 2E, 3L these actions represented dialectical change. Further reflection on the change processes can define them as evolutionary in that they illustrated a possibility for gradual improvement of soil fertility and food security over time.

Three teachers dealt with composting in lessons but only in one case (Weliwe), was compost made with the help of learners (who collected waste from parents at home) and agency demonstrated. Because the action was linked to IM-3L it was an example of an iterative relationship between learning and doing (Section 8.2.2). The two teachers that dealt with mulching did so at the level of theory in the classroom, while the practical agency of the

actual mulching was facilitated by the teachers with colleagues. Individual agency on the part of one learner was illustrated when he requested a reused container to make a bin for his new classroom. In another case a learner rescued a praying mantis from his peers in the classroom, indicating that his thinking was consistent with his teacher's concern about fighting nature. Such instances of demonstrated care are particularly significant in a country such as South Africa where violence in classrooms is an everyday occurrence (Nelson Mandela Foundation, 2005 – Section 2.4)

Recycling by making toy balls, fireballs and paper (Sections 7.2.1.3 and 7.2.2.3). These three actions were concretely grounded in that they were small scale, and linked to the curriculum requirement for participating in a recycling project and for exploring 'alternative goods' (1M). They were responding to the absence of appropriate waste management structures and systems. The actions were reasoned as a way of reducing waste which would otherwise be blown out of the rubbish pit, or burned with the risk of contributing to respiratory diseases in the community (2E). These actions were determined by value-based deliberations that were concerned with people's rights to a healthy environment (3L). The change processes here were dialectically grounded in 1M, 2E and 3L; and evolutionary in that they represented examples of ways that recycling initiatives could contribute to income in the community. Learners demonstrated agency by each learner's direct involvement in a recycling action. However, the actions also had the potential to perpetuate the status quo of poor people's dependence on the waste of others (Samson, 2009 – Section 8.2.4), thus highlighting the need to identify false trails (such as accepting this inequality) and to direct moral criticism "against practices which allegedly are not respecting ... existing social values" (Parker, 2010: 221 – Section 4.2.3). This identification of false trails would then have the potential to address the "dialectic between the pull of universal moral tendencies, and the constraints of a real world" (Shipway, 2001: 194-195 – Section 4.2.3) through asking which of the reasons for recycling impose "constraints on self-emancipation" and which are "optimally grounding reasons"? Then other "non-actualised possibilities" can be explored such as alternative economies that are less toxic, and not so dependent on non-renewable resources.

The change also had entropic potential if waste were to be 'glorified' to the point of encouraging consumerism, thus encouraging more buying, more waste, more pollution and more 'chaos'.

A frustrated need for effective waste management systems meant that in 2009 one teacher still had waste paper in her classroom collected from the previous year. This paper had been

collected for recycling in order to avoid burning it, but the school was still unfenced, meaning that bins would more than likely be stolen. No recycling facilities or collection system had been established in the nearby town. As a result, they were still burning waste at school in order to stop it being blown out of the rubbish pit by the wind (Section 7.2.1.4). The fireballs could also be considered to be an example of entropic change in that they raised potential further contradictions (adding more complexity to the laminated totality) because of their potential to add to the problem of respiratory disease already identified as a problem with respect to the burning of waste (Section 8.2.6).

Re-use by making items from waste and re-using plastic drinking bottles (Sections 7.2.1.3 and 7.2.2.3). These two actions were concretely grounded in that they were small scale, and linked to the curriculum requirement for developing activities to illustrate re-use (1M). The activities were responding to absences of waste management structures and systems and health. The actions were reasoned (and in one case measured – albeit not particularly accurately) as a way of reducing waste which would otherwise be burned and contribute to respiratory diseases in the community (2E) and determined by value-based deliberations that were concerned with personal and environmental health (3L).

The change processes here were dialectically grounded in 1M, 2E and 3L and illustrated cases of an iterative relationship between learning and doing. They were also evolutionary in that they illustrated ways that items made from re-used materials could contribute to income in the community. All learners were encouraged to participate and demonstrate agency. The change was strengthened by the agency of parents who supported the initiative to re-use plastic drinking bottles.

Waste management and litter clean-ups in and around the school (Section 7.2.2.4). These actions evolved out of a 2E understanding of the absence of bins in Weliwe's school and 3L value-based reflexive deliberations where learners talked about roles and responsibilities in relation to waste regulation in South Africa. This is illustrative of concrete utopianism involving "thinking about how a situation of the world could be otherwise, with a change in the use of a given set of resources" (in this case more bins were provided in the school) "or with a different way of acting subject to certain constraints" (in this case, learners and street vendors were involved in litter clean-ups) (Bhaskar, 2010: 22 – Section 2.6.3). The addition of more bins represented local-scale revolutionary (quick, sure and distinctly evidential) change in the school. Further agency in one learner was illustrated when he came to his teacher requesting a re-used container to make a bin for his new classroom (Section 7.2.2.4).

Reflections on how clean the grounds remained after the clean-ups were not presented in Weliwe's portfolio. Such evidence would be needed in order to reflect on the action as enabling changed ways of seeing **and** being (Wals, 2009 – Section 3.4), however it is possible that through dialectical grounding in 2E understandings and 3L value-based reflexive deliberations referred to above, learners would be more able to 'see' a reason for 'being' different and thus potentially be more disposed towards 4D transformative agency (using bins consistently and/or picking up litter of their own accord). This case can be compared with Nomonde's school where responses to waste were part of the daily routine rather than integrated with curriculum work in an iterative process between learning and doing. In this case where learners were coerced into picking up litter regularly as punishment (Section 7.2.3.1), it could be argued that these actions had less potential for transformative agency as also argued by Silo (2011). Enforced litter clean-ups have the potential to 'hide' reproduction of the status quo where unmanaged waste pits and littering by individuals continue without an obvious need to be addressed.

Transformative agency in food security

Starting a school vegetable garden (Sections 7.2.3.4, 7.2.4.4 and 7.2.5.4). The agency displayed by teachers and learners in starting vegetable gardens in their schools was grounded in real possibility in the form of experience with gardening (in Nomhle's and Mhizana's cases), however vegetable gardening was concretely challenged in Nomonde's case because of a shortage of water and poor soil which resulted in a very small harvest despite mulching and addition of ostrich manure (Section 7.2.3.4) (1M). The teachers were not explicitly led to the idea of gardening through the RNCS curriculum but teachers were perhaps influenced by programmes such as 4H, Eduplant and the Wildlife and Environment Society (Section 7.2.5.1) as well as the 'action' imperative of the Schools and Sustainability Course (Section 8.2.2) (1M). However, by linking gardening to a (Grade 6) problem-solving **activity** in Social Sciences (Table 7.10), Mhizana integrated indigenous vegetables in the school garden as a way of addressing the problem of food security; and by linking gardening to thinking and reasoning in Home Language (Table 7.11), Nomhle used gardening as a context for learning instead of as an expected outcome of learning. In all three cases, the activities responded to absence of food security amongst learners and the absence of a reliable school feeding scheme. Gardens were driven by empirically based investigations (in the cases of Nomhle and Nomonde) that learners needed to eat more meals per day and to have more of a balanced diet (2E). In the case of Nomhle gardens were improved based on a comparative study between two gardens illustrating particular needs for vegetable gardens – compost, water, weeding and fencing (2E). Rights-based discourse regarding learners' right to a healthy diet influenced all

actions as well as (in Mhizana's case) the valuing of indigenous knowledge which encouraged an interest in including wild vegetables in the school garden (3L).

A sense of transformative agency amongst teachers, learners and parents was evidenced in Nomhle and Mhizana's cases by the following: Nomhle planted a small garden with her Grade 1s in which they succeeded in growing broccoli, which was unconventional in community vegetable gardens (illustrating a new way of seeing and being). Nomhle was also responsible for the school's larger vegetable garden which (in collaboration with the principal who secured financial support and community youth for labour) succeeded in growing six different vegetables. This enabled vegetables to be added to the school feeding scheme with extra income in order to buy bread and jam when the feeding scheme was unable to deliver (Section 7.2.4.4). Mhizana's school was able to sell vegetables and add vegetable soup to the school feeding scheme twice a week. She also noted that three gardens had been started in the community inspired by their school garden (Section 7.2.5.4).

These two gardening activities mentioned above were dialectically grounded in 1M, 2E and 3L and illustrated cases of an iterative relationship between learning and doing and emergent transformative praxis. These actions were evolutionary in that they represented opportunities for schools and communities to become more self-sufficient over time. Nomhle also was involved in a local-scale revolutionary activity which addressed the absence of mechanisms for ensuring that learners have access to social grants to which they are entitled (Nelson Mandela Foundation, 2005 – Section 1.6). After establishing that three learners were not being adequately fed at home, she helped them to arrange social grants to which they were entitled (Section 7.2.4.4.). However there is a tension in both of these evolutionary and revolutionary activities in that they can 'hide' another absence in the community, namely poverty and inequality; as well as the absence of a social worker in the school – thus loading the responsibility on a teacher and contributing to the inflated role of teachers (Morrow, 2007 – Section 4.3.3).

Another example of local-scale revolutionary change and learner agency was Nomhle noting that learners started bringing fruit in their lunchboxes (Section 7.2.4.4). In addition, Mhizana, noticed that learners were talking amongst themselves advising their peers on reducing sweets, eating more fruit and vegetables and drinking water (Section 7.2.5.4).

Transformative agency in accessibility to water and sanitation in the school

“Recycling” of wasted water. This action was dependent on the “recycling” of wasted water from dripping taps which was directed into swales and keyholes in the school permaculture

garden (Section 7.2.6.3). The established nature of the garden made this activity a real possibility in the context of the real limitation of water shortage in South Africa (1M). The activity was an elaboration on the Life Orientation interest (1M) in recycling and the Geography interest in making “informed decisions about social and environmental issues and problems” (Table 7.15). The activity grew out of the problems identified in an investigation of water waste ‘hot spots’ where an absence of health and hygiene was identified with respect to no access to toilets or running water and stagnant water causing pollution in terms of smell (2E). They were also driven by knowledge of activities for absencing water waste: water-wise initiatives in the school permaculture garden (collecting water from dripping taps, swales, keyholes and mulching) (2E). These actions were further driven by value-based reflexive deliberations that were integral to the development of a school water policy with learners (3L). With swales and keyholes already established in the school learners became involved by collecting and measuring water in a bucket for use in these water harvesting practices, thus illustrating transformative praxis grounded in 1M, 2E and 3L. The transformative agency here was supportive of an established practice in the school which represented evolutionary change in that it was a temporary response to a bigger problem of damaged infrastructure. This bigger problem was addressed later.

It was thus illustrative of finding a “different way of acting subject to certain constraints” (Bhaskar, 2010: 22 – Section 2.6.3) (in this case accepting that the damaged water infrastructure would not be repaired in the near future).

Writing letters regarding water and sanitation issues in the school (Sections 7.2.5.4). This action was concretely grounded in the knowledge that the school was crowded, that it had a poor quality water and sanitation system and that problems were exacerbated by vandalism and theft from the neighbouring community (Section 7.2.6.1). The action was linked to an elaboration of Life Orientation interests in “identifying people to report cases of crime, abuse, illness ...” (Table 7.16) (1M). Learners were responding to empirical observations in the school that water and sanitation problems were causing a bad smell and lack of facilities resulted in learners going home early from school, as well as measurements of water loss due to dripping taps and broken pipes (2E). These actions were influenced by the school water policy described above (3L). Grounded in this 2E and 3L work, learners displayed transformative agency in letters written to a local municipal councillor, principal and school governing body requesting improvement in the situation (Section 7.2.6.4). In response to this letter, community meetings were held which resulted in pipes being repaired and the problem of vandalism stopped when monitoring processes were instituted (Section 7.2.6.4). This transformative agency was a case of indirect action (letter writing) (Jensen and Schnack, 1997

– Section 3.3) influencing relevant others to make an appropriate revolutionary change and representing a case of a “new way of being and seeing” (Wals, 2009: 385 – Section 3.4).

Development of water conservation placards (Section 7.2.6.3). This transformative agency was grounded in the same 2E and 3L processes and represented another case of indirect action. It could also be seen as another case of a new way of being and seeing with learners seeing the importance of water and becoming ‘activists’ (in the above case as well) by lobbying for change in the school.

Reflections on structural elaboration and reproduction through emergent active learning processes

Section 8.2.1 presented a view of society as emergent from relatively enduring structures (‘being’ at 1M) and Section 8.2.7 reflected critically on some of the actions that emerged through active learning processes on the Schools and Sustainability Course. Structures might impose limits on, or offer possibilities for, agents’ ‘becoming’ (from 2E, through 3L and 4D) through passive or active agency at varying degrees of scale, so that agents may play a role in changing the structures within which and upon which they act. Morphogenesis (structural elaboration or change) and morphostasis (structural reproduction or no change) (Archer, 1998b – Section 2.4) are societal processes that happen with or without educational intervention, and while active learning processes cannot create or stop change, they can **catalyse, strengthen or redirect change** (structural elaboration/morphogenesis) or simply engage learners in change processes that **do not result in any structural change** (structural reproduction/morphostasis). This section discusses examples from the study which illustrate cases of structural elaboration and reproduction.

In Nomhle’s and Mhizana’s school gardens, ecological possibilities were **strengthened** through active learning processes (growing indigenous plants, creating compost or redirecting wasted water in water harvesting practices) which **elaborated** the ecological potential for growing food, thus illustrating examples of emergent active learning processes as transformative praxis. However, in one of the gardens, ecological limits of drought and soil degradation **prevented the effecting of structural elaboration**.

Socio-economic structural limitations affected community involvement in the schools. In Mhizana’s school, active learning processes **catalysed** parents’ contribution to knowledge of local heritage and culture; while in Zodwa’s school, destructive community relations were **redirected** to a co-operative self-monitoring relationship with the school. In both these cases the active learning processes emerged as transformative praxis. In Zodwa’s school, despite

the successful case of improved relations, an internal relational issue (the principal's concern with teachers being taken out of the classroom) **discouraged further structural elaboration** after withdrawal of the school from the Eco-Schools programme.

In Weliwe's case, waste management activities involved **strengthening** of parental involvement in reducing, recycling and picking up litter, as well as changing the waste management system itself by adding more bins (**structural elaboration**). This case was illustrative of emergent active learning processes as transformative praxis. In Nomonde's case, learners collected waste for recycling, but no system was in place for dealing with this waste thus resulting in a case of **structural reproduction**.

Contingencies influencing transformative agency

The practical action activities listed above: composing, paper-making, toy balls, fireballs, growing vegetables and permaculture water saving techniques were contingent either on 'how-to' teaching and learning support materials, teachers' experience or the mobilisation of prior knowledge of parents and community members. This 'how-to' knowledge (making a significant contribution to enabling 4D transformative agency) relates to Bhaskar's distinction between practical 'how' knowledge and discursive 'that' knowledge (1993 – Section 2.2).

There is a danger that if a project becomes too big and challenging it can become disempowering (Section 3.4). The role of young learners in projects needs to be considered. For example, Nomonde found the Grade 1s too small to handle the garden tools (Section 7.2.3.4). Nomhle started a learning-focused garden with Grade 1s separate from the garden designed to supplement the school feeding scheme. This strategy de-linked the learning imperative from the struggles of the large ambitious garden and enabled Grade 1s to see results of their gardening (Section 7.2.4.1).

Practical support from partners such as advice and provision of seeds and mulch from WESSA is significant in enabling environmental projects in the schools (Section 6.4.7.4). Also, parental involvement can make valuable contributions to school environmental projects. For example, they can be involved in supporting projects over the holidays, or contribute land for gardening where the school is not secure. This is contingent upon a long process of developing relationships of trust and co-operation (Section 7.2.6.4).

Appropriate technical infrastructure is another contingency important in transformative praxis, such as in the case of water and sanitation which needed intervention by the municipal councilor.

Summary and implications of analytic statement

This section summarised a number of cases of transformative praxis arising from dialectical change processes while highlighting the significance of 1M, 2E and 3L moments that lead up to the transformative agency represented by the change projects implemented in the schools. This illustrates that, despite the fact that it is not the role of education to solve society's problems, small scale and manageable projects can enable opportunities for developing an iterative relationship between learning and doing in which relational situated learning contributes to the understanding of absence and absencing and in which value-based reflexive deliberations enable morally reasoned informed choice. The section presented cases of revolutionary and evolutionary change which could be related to morphogenesis (Archer, 1998 – Section 2.4) even if structures and mechanisms were changed only at the local level and even when there was potential to lead to increased entropy; and a few cases of morphostasis (ibid.) where teachers were unable to significantly change the status quo. The section has also highlighted the need for 'how-to' knowledge in supporting transformative agency and pointed out the size and complexity of projects which need to be matched to the ages, capacities, and practical limitations, and linked to the provision of appropriate infrastructure in the schools.

8.3 USING THE MELD IN DEVELOPING AN UNDERSTANDING OF ACTIVE LEARNING PROCESSES

This section is concerned with the second question of the research: *How can dialectical critical realism contribute to environmental education research?* This question is answered through the fifth goal of the research which was to: **Reflect on the ontological-axiological chain (MELD Schema) as a tool for analysing active learning environmental education processes.**

8.3.1 Analytic statement 8: A MELD analysis offers an explanation of active learning as a diachronic, emergent and open-ended process

Knowledge of 'how change happens' is an important foundation for teachers wanting to catalyse change in their communities. The 4D focus on transformative agency gave insight into the role of education in society and emergent active learning processes as action-oriented. 4D reflection on transformative agency was important because of environmental education's explicit interest in: "problem-solving", "critical action" and "ways of doing things

differently” (O’Donoghue et al., 2007: 7 – Section 3.3); and action competence calling for actions (direct or indirect) that are conscious and targeted at environmental issues (Jensen and Schnack, 1997 – Section 3.3.2). The notion of 4D transformative agency as only a final step in a process involving ontological grounding, understanding of absence, and value-based reflections on totality. This can provide insight into the purpose of education as it allows for change to be seen as transformative praxis with a developmental rather than a behavioural change interest (Wals & Jickling, 2009 – Section 3.4), that does not have a goal directed insistence on “solving society’s problems” (Jensen & Schnack, 1997 – Section 3.4). Section 8.2.2 highlighted how a reframing of an interest in action in response to environmental issue and risk to an interest in the processes that lead up to that action provide a nuanced vision of active learning that does not judge an educational process by its outcome but by the depth of the insights into absences (2E) and moral deliberations (3L) involved in the processes and by the degree of reality congruence (1M) associated with these; thus presenting a vision of active learning which is reality congruent, has a “shared moral purpose and a situated capability” **within** processes of active engagement (O’Donoghue, 2007: 153 – Section 8.2.2).

The MELD schema was also used in order to understand relational processes through the notion of concrete universality (Bhaskar, 1993) which includes the notion of **concrete singularity** (requiring sensitivity to local context at 4D), grounded in **universal** rights and freedoms at a global level (1M), conscious of **processuality** with the understanding that global concerns and interests will manifest in dynamic and changing ways at the local level (2E), and subject to **mediation** within and between the parts and the whole (3L) (adapted from Hartwig: 2007 – Section 4.2.3).

In order to present detail of what happens at each stage in the MELD schema, the analytic statements above introduced each stage separately, however, this was purely for analytic purposes because each progressive stage could not be described without reference to the stage before. Thus 2E representation of absence as process could not be understood without understanding how these emerged from 1M stratified ontology, 3L value-based reflexive deliberation could not be understood without understanding of laminated totalities and their “relationship of dependency and interdependency, and of their characteristic patterns of interaction and intra-action” (Bhaskar, 2010: 14 – Section 2.6.3), and 4D transformative agency could not be understood unless reflecting on how it emerged from real possibility, understanding of absence, and morally reasoned (informed) choice.

8.3.2 Analytic statement 9: 1M non-identity enabled an understanding of the possibilities for active learning grounded in social-ecological conditions, stratification of personality, teacher professional development processes and educational contexts and curricula.

The MELD Schema enabled an ontological perspective on active learning processes, elaborating on absences associated with particular environmental issues at the level of generative structures and mechanisms, events and experiences (Table 8.1). This was through deference to the 1M interest in a stratified ontology (Bhaskar, 1998a – Section 5.2). The absences identified at this level of reality gave insight into “constraints on desires, wants, needs and interests” (Bhaskar, 1993: 175 – Section 2.2), in this case particularly basic needs of children such as food, a healthy environment and access to education. This aspect of the research was a response to a growing ontological perspective in environmental education research which “rather than seeing humans as separate to nature or environment (with capacity to control it with knowledge), sees humans as part of nature or the environment, where values and practice emerge as being as significant as knowledge” (Lotz-Sisitka et al., 2012 - forthcoming: 6).

Section 8.2.1 also illustrated how a focus on Plane [d] in terms of the four-planar being (a feature of 1M) engages a consideration of “stratified personality” (Bhaskar, 1993: 163 – Section 2.4) which can provide insight into the role of teacher skills and disposition in influencing emergent active learning processes.

Lastly, consideration of 1M (across Sections 8.2.1 – 8.2.4) also encouraged an exploration of the generative structures and mechanisms, events and experiences in the educational environment (in this case particularly the South African curriculum) and in the teacher professional development course (Schools and Sustainability) through consideration of curriculum principles, purpose statements and other structural elements; and course materials, activities and discussions. This enabled a search into the possibility for relational situated learning, values-based reflexive deliberative learning and action-oriented learning as outlined by the curriculum and the course.

8.3.3 Analytic statement 10: 2E negativity enabled a focus on how relational situational processes in emergent active learning processes can contribute to an understanding of absence as process

Critical realism at 2E enables an understanding of “how people live... under structures that alienate them” (Norrie, 2010: 130 – Section 2.6.2) – in other words, this is understanding the

moment of “becoming” (Norrie, 2010 – Section 2.6.2) or the moment of engagement at Plane [c] (Bhaskar, 1993 – Section 2.4) with institutions, structures and forms. In this case this meant a focus on describing what happened when teachers and learners engaged with the 1M curriculum and course possibilities presented to them in the context of social-ecological realities.

The absences highlighted in Section 8.3.1 can be considered as absence as product (Hartwig, 2007 – Section 2.3). This interest in absence was important in this study because it helped to deepen an understanding of how absences (such as of human rights or social justice) can serve as a “dynamo of conceptual or social change” (Bhaskar, 1993: 175 – Section 2.2), and illustrated the importance of understanding absence because transformative praxis is about “absenting the given (and typically driven by and against absence)” (Bhaskar, 1993: 152 – Section 2.3).

Focusing on 2E enabled a consideration of absence as process (Hartwig, 2007 – Section 2.3) which can be elaborated through an understanding of the “tri-unity of causality, space and time in tensed rhythmic spatialising process” (Bhaskar, 1993: 392 – Section 2.6.2). In this study, for example, this entailed a consideration of “tensed socio-spatialising process” (Bhaskar, 1993: 160 – Section 2.4) in the continued prevalence of poverty and inequality between: places, pre- and post-apartheid times, and racial and socio-economic divides; all strongly influenced by the presence of apartheid past (Section 8.2.1). In a further example, 1M unemployment, drought and land degradation in the Eastern Cape, and an ineffective 1M school feeding scheme had different 2E manifestations depending on their place in space across schools (Nomonde’s area was more strongly effected by drought and land degradation) and across families (three of Nomhle’s learners were not receiving breakfast before coming to school). This understanding is important in environmental education research because without this understanding of society as emerging from a stratified ontological reality, change would be seen as an inflexible process determined by social structures – which Giroux (1980 – Section 4.2.2) argues is the problematic assumption of correspondence theory.

8.3.4 Analytic statement 11: A 3L focus on totality enabled insight into emergent active learning processes as value-based reflexive deliberations

A 2E analysis of absence as process helped with developing an understanding of laminated totalities at 3L as a “relationship of dependency and interdependency, and of ... characteristic patterns of interaction and intra-action” of ontologically distinct but interacting mechanisms

(Bhaskar, 2010: 14 – Section 2.6.3). In this study this 3L interest was related to the curriculum interest in awareness of the “relationship between human rights, social justice, environmental health and inclusivity” (South Africa. Department of Education, 2002j: 10 – Section 1.3). This interest inspired critical reflection on how situated learning processes entailing “investigations in local surroundings” (O’Donoghue, 2001: 7 – Section 3.2) enabled local knowledge and experience to be related to national and global perspectives (with elaboration through the notions of concrete universality (Sections 8.2.3 and 8.2.5).

The educational challenge at 3L is in making informed choices in the light of these laminated totalities. These are choices involving deliberations at the level of the intra- and inter-subjective (see plane [b] of Bhaskar’s social cube – Section 2.4), for example a child deciding to save a praying mantis or a group of teachers deciding on how to ensure safety for learners (from snakes) and their health at the same time (by not burning grass). Negotiating such dilemmas is essential in choosing between better or worse in order to determine action (Price, 2007 – Section 3.4). This gives insight into an environmental education interest in a search for new ways of “being and seeing” (Wals, 2009: 385 – Section 3.4) also reflected in an earlier discourse of an explicit counter-hegemony (Fien, 1993 – Section 3.3) (for example cutting instead of burning grass and using it as a mulch).

Introducing a 3L focus to environmental education research helps with the understanding that finding new ways requires finding ways to development the capacity for judgmental rationality in the presence of epistemological relativism (Archer et al., 1998 – Section 2.1), or finding ways of moving from ‘is’ to ‘ought’ (Bhaskar, 1993 – Section 5.2). It is through a focus on 3L that we come to understand environmental education processes that do not fall into the trap of preaching Utopianist or reified visions (Jickling, 1992, Lotz-Sisitka, 2008 – Section 3.4) and which “stand up to tests of truth and normative judgement” (Lotz-Sisitka, 2008; Brown, 2009 – Section 3.4). This is, for example, highlighted by challenging the notion of recycling as an assumed good because scientifically one can argue the value of waste reduction (Section 8.2.4), the knowledge that not everything can be rationalised through scientific thought (Lotz-Sisitka, Fien and Ketlhoilwe, 2012 – Section 8.2.4), and Hartwig’s (2007 – Section 2.6.3) explanation that at 3L, judgements need to be “morally universalisable” (for example, by taking care regarding who should be recycling and under what circumstances).

Relevant to 2E is Sayer’s warning that is not easy to decide on the “the nature of the good” (2000: 159 – Section 4.2.3). This was highlighted in this research by environmental issues which stimulated deliberations at the “nexus of competing and antagonistic ideologies”

(Bhaskar, 1993: 161 – Section 2.5; Section 8.2.6). Sayer’s suggestion that there is a need to identify “false beliefs and frustrated needs” (ibid.) helped to develop an analytic structure for the value-based reflexive deliberations discussed in Section 8.2.6, thus giving insight into what happens when “mirroring one’s own ideas, views, values and perspectives with those of others” (Wals, 2009: 385 – Section 3.4). Also important in helping to make informed choices is Bhaskar’s notion of “concrete utopianism” – that is a reminder that that alternative ways of living need to be constructed “based on some assumed set of resources” – for example, if deciding to plant a garden it needs to be decided on the assumption that sufficient water, nutrients, fencing, human resources and finances are available. This is a reminder that 1M considerations need to be incorporated at 3L and is consistent with O’Donoghue’s concern that “practice-based deliberations ... might allow the better mediation of choices that are more reality congruent and socially responsible” (2007: 153 – Section 3.4).

8.3.5 Analytic statement 12: A 4D understanding of transformative agency enabled critical reflection on the nature and transformative potential of action-oriented active learning processes

Critical reflections on transformative agency at 4D enabled elaboration on both direct and indirect change (Jensen and Schnack, 1997 – Section 3.3) through Bhaskar’s (2010: 14 – Section 2.6.2) highlighting of “dialectical and entropic types of change” and “evolutionary and revolutionary” change. This study highlighted different types of change at different orders of scale (Section 8.2.7). These instances of change illustrated that even though it is not the role of education to change society, active learning processes involving iterative processes of learning and doing can be instigated through small manageable projects that are illustrative of local-scale revolutionary or evolutionary impacts on societal structures and mechanisms. Through illustrating the transformative potential of emergent active learning processes at small and local scale, these illustrations provided evidence that supports O’Donoghue’s (2007: 153) suggestion that “practice-based deliberations ... might allow the better mediation of choices that are more reality congruent and socially responsible”.

A 4D analysis also enabled insight into the environmental learning interest in new ways of “being and seeing” (Wals, 2009: 385 – Section 3.4) by drawing attention to how the actions instigated by teachers and learners represented “thinking about how a situation of the world could be otherwise [new ways of seeing], with a change in the use of a given set of resources or with a different way of acting subject to certain constraints [new ways of being]” (Bhaskar, 2010: 22 – Section 2.6.3).

8.3.6 Analytic statement 13: A MELD analysis enables an in-depth perspective on active learning processes amongst young learners

The MELD analysis conducted in Section 8.2 enabled an understanding of successes and challenges for young learners from the moment of becoming at 2E. By focusing on 2E, the analyses highlighted young learners' capacity to know and understand absences (Section 8.2.5), but at the same time highlighted the significance of scaffolding investigations and the use of Home Language for complex understandings of how environmental issues come to be. At 3L, the analysis considered learners' engagement with values in relation to their place in their schools and society highlighting the significance, in decision-making (such as in determining 'relative goodness'), of morally reasoned choices or "skills of analysing alternative viewpoints on environmental issues, recognizing the values that underlie them, and evaluating the consequences of alternative solutions to environmental problems" (Knapp, 1983 in Fien, 1993: 63). At 4D the analysis of transformative agency illustrated that young learners can demonstrate agency in small but significant ways (the case of the new bin and the praying mantis) (Section 8.2.7). Acknowledging learners' 2E and 3L engagements with their world highlights that no matter how small the ultimate transformative praxis, significant learning has taken place to develop learners' capacity (or action competence – Section 3.3.4) to contribute to decision-making and ultimately change in their world through understanding absences, and reflecting on the implications of change (no matter how small) for the holistic whole. These observations give insight into Shipway's argument that learners can demonstrate degrees of rationality (Section 4.6.1) and illustrate that young learners have a certain degree of capability to engage with change at all levels of the social cube (Bhaskar, 1993 – Section 2.4). This strengthens, and provides insight into, arguments for including active learning pedagogies in the Foundation Phase curriculum such as those presented by Lotz through pinpointing "real possibilities that younger learners are able to participate in solving environmental problems, to develop critical thinking skills, to act as catalysts of change, and to become environmentally literate" (1996: 296 – Section 4.6.3).

8.4 CONCLUSION

This chapter has used Bhaskar's ontological-axiological chain (MELD schema) to describe transformative praxis in emergent active learning processes from the stratified reality (describing experiences, events and mechanisms) or "pre-existing ongoing network of social and material and semantic relations" into which the participating tutors, teachers and learners were "thrown" (Bhaskar, 1993: 190). This is the first moment out of which the second edge emerges. At the second edge (negativity), emergent active learning processes involve situated

explorations of absence and absencing processes which act as a dynamo for strengthening or redirecting change processes set in motion at this point. Out of this emerges the third level of consideration of totality where value-based reflexive deliberations are engaged based on the notions that the “free flourishing of each is a condition of the free flourishing of all” (Hartwig, 2007: 157 – Section 2.2). Finally, the fourth dimension emerges, the dimension where transformative agency is enabled through practice emerging from its relation to non-identity, negativity and totality.

In a methodologically reflexive manner, this chapter has also considered the role of the MELD schema in explaining the active learning processes emergent from the Schools and Sustainability Course, and has provided insight into the value of the MELD schema for developing new understandings of active learning as emergent from a stratified ontological reality rather than as an inflexible predetermined process.

CHAPTER 9: CONCLUSION

9.1 SUMMARY OF THE RESEARCH

This study examined emergent active learning processes in the context of the 2008 Schools and Sustainability Course as described in Section 6.2. The active learning processes were emergent in an educational context of curriculum change (Section 1.3). Curriculum change indicated a transformative/radical as well as progressive intention in school and teacher professional development curricula (Section 4.3.2 and 4.5.1); but these were characterised, in practice, by a radical emphasis without the autonomy and reflexivity expected from a progressive curriculum intention (Harley and Wedekind, 2004, Section 4.5.1). This was partly ascribed to the dichotomising of ‘new’ and ‘old’ curricula resulting, for example in ‘outcomes’ being favoured over ‘content’ and ‘learner-centred’ over ‘teacher-centred’ (ibid.). This situation has been followed by a renewed emphasis on “what is to be learned and how” in the revised school and teacher education curricula (South Africa. Department of Higher Education and Training, 2011: 7 – Section 4.3.4).

The post-1994 school and teacher education curricula were implemented in a country with high levels of poverty and inequality, and, in this particular study, within one of the country’s poorest provinces the Eastern Cape amongst marginalised rural and township schools (Section 1.6). The educational crisis in this context is characterised by poor results in international and national literacy and numeracy tests (Section 1.4) and social-ecological challenges regarding food security, waste management and access to water and sanitation affecting access and performance in schools (Sections 4.6.1 – 4.6.3).

Responding to an under-theorising of the concept of active learning in the field of environmental education (Section 1.2), this study sought to explore key features defining the concept, through reference to national (Section 3.3) and international (Section 3.4) literature. From this, the concept of active learning was elaborated as situated, action-oriented, and deliberative and co-engaged. Situated learning was described as practically grounded in explorations of human-environment relationships, within real, relevant and authentic situations (Section 3.3.1). An action orientation was described as counter-hegemonic and values-based, including the investigation of small alternative practices with a developmental rather than behavioural emphasis (Section 3.3.2). Deliberation referred to critical thought, exploration of world views, and choice-making in a co-engaged democratic process involving sharing, reporting and mediation and grounded in the context of a real and holistic whole (Section 3.3.3).

The data for the study was presented in Chapters 6 and 7. Chapter 6 began by presenting the basic content of the three Learning Units of the Schools and Sustainability Course (focusing on curriculum and environmental information, environmental enquiry and action, and assessment and planning for environmental learning) and described the lesson plans which teachers developed, implemented and presented in portfolios of evidence as applied course assignments. This was followed by a review of initiatives influencing the development of the Schools and Sustainability course, and a description of the interactions and deliberations of the Schools and Sustainability Course. Chapter 7 presented a description of school, community, teacher and classroom contexts and presented detail of the emergent active learning processes, later discussed in terms of their situated, action-oriented, deliberative and co-engaged nature.

Dialectical critical realism, and particularly Bhaskar's (1993) theory of change – the ontological-axiological chain or MELD schema (Section 2.6), provided a framework and language of description for analysing change in emergent active learning processes. The research findings in relation to the third research goal (to 'Use the ontological-axiological chain (MELD Schema) to explain the relationship between active learning processes and transformative praxis'), were reported in detail in Section 8.2 through analytic statements 1-7. The first four analytic statements focused on the possibilities inherent in social-ecological, curriculum and teacher professional development (in this case the Schools and Sustainability Course) contexts. The next three statements focused on the planning and implementation of active learning processes emerging from the social-ecological, curriculum and Schools and Sustainability Course context. These statements were directed at answering the first research question of the study: ***How do emergent active learning processes manifest as transformative praxis in the context of teacher professional development?*** The main findings associated with the first four analytic statements can be summarised as:

- Analytic Statement 1: A transformative and action-oriented approach to active learning was influenced by a context of poverty and inequality manifesting as food insecurity, insufficient waste management systems, and damaged infrastructure for water and sanitation systems in schools. A transformative course ideology and teachers' pastoral dispositions resonated with explicit transformation interests defined in the role and purpose of different learning areas. The course tutors worked with teachers to 'bring out' this explicit interest by applying it to curriculum learning outcomes. This transformative interest was applied in the context of environmental issues identified through participation in the Schools and Sustainability Course.
- Analytic Statement 2: Transformative praxis in emergent active learning processes had the potential to be strengthened through drawing on both the radical competence

and progressive ideologies of the South African RNCS while emphasising the action-orientated and deliberative and co-engaged nature of emergent active learning processes as about an iterative relationship between learning and doing.

- Analytic Statement 3: The RNCS curriculum had the potential to situate learning through emphasising different modes of enquiry and data representation methods (Section 7.3). The Schools and Sustainability Course influenced the realisation of the curriculum's enquiry potential through presenting an interest in "investigations in local surroundings" (O'Donoghue, 2001: 7 – Section 3.2) and through introducing qualitative and quantitative techniques and tools. The study explored how local knowledge and experience were related to abstract knowledge in the context of a concern for a content-poor curriculum (Dada et al., 2009 – Sections 1.3 and 4.3). Secondly, the study explored how local knowledge and experienced was related to national and global perspectives, in the context of a concern for learning not progressing beyond simply learning about the surroundings" (Doc 7 – Section 6.3.3.1). Thirdly, the study explored how local enquiries were related to different layers of stratified reality, in the context of a concern that, in the South African RNCS, knowledge is poorly presented in terms of progression and depth (Dada et al., 2009: 24 – Section 1.3; Section 4.5.4). Finally the study explored how enquiries were related to "tensed socio-spatialising processes"(Bhaskar, 1993: 160 – Section 2.4) in the context of curriculum interests such as "historical redress" (South Africa. Department of Education, 2002h – Section 4.5.1).
- Analytic Statement 4: The RNCS curriculum and Schools and Sustainability Course structures and mechanisms introduced value concerns regarding environmental issues and risks, but did not provide much guidance on how to find a way forward within the complexity of laminated totalities, that is to find a platform for "holistically totalizing intentional change" (Bhaskar, 1993 – Section 2.2). Section 8.2.4 proposed that teaching and learning activities that do not support reflexive value-based deliberations and informed choice may have limited potential for supporting transformative praxis.

The main findings associated with the next three analytic statements focusing on the planning and implementation of active learning processes emerging from the social-ecological, curriculum and Schools and Sustainability Course context, can be summarised as follows:

- Analytic Statement 5: Lesson plan development and implementation supported the exploration of absences in social-ecological contexts through a situated learning approach involving learners in investigating local knowledge and experience of food

insecurity, insufficient waste management systems and damaged water and sanitation infrastructure. Knowledge and experience of these absences were related to: school knowledge such as the notion of a ‘balanced diet’; a depth ontology perspective considering absences from the point of generative mechanisms such as poverty, unemployment and child and grandparent headed households; a national perspective referring to waste and human rights policy; and tensed socio-spatial cultural and historical processes such as the activity focusing on the use of indigenous vegetables in the past.

- Analytic Statement 6: Despite no explicit guidance from the Schools and Sustainability Course on how to deal with value-based deliberations in the classroom context (Analytic Statement 4), lesson plan development and implementation involved learners in value-based reflexive deliberations with evidence, in some cases, that this increased their capacity for making informed choices in emergent active learning processes. In these cases, the focus on values in classroom communications highlighted emergent contradictions, and led to the identification of “false beliefs and frustrated needs” (Sayer, 2000 – Section 5.2), thus leading to an understanding of how Power2, communicative and moral relations lead to a “nexus of competing and antagonistic ideologies” (Bhaskar, 1993: 161 – Section 2.5).
- Analytic Statement 7: Lesson plan development and implementation involved learners in action projects which represented cases of dialectical change (transformative praxis) where the unity of “theory and practice in practice” (Bhaskar, 1993 – Section 2.6.4) was evident, highlighting the significance of 1M, 2E and 3L moments that lead up to transformative agency. This section highlighted that small scale and manageable projects can enable opportunities for an iterative process between learning and doing in which relational situated learning contributes to the understanding of absence and absencing, and in which value-based reflexive deliberations enable morally reasoned informed choice. The section presented cases of revolutionary and evolutionary change which could be related to morphogenesis (Archer, 1998 – Section 2.4) even if structures and mechanisms were changed only at the local level and even when there was potential to lead to increased entropy; and a few cases of morphostasis (ibid.) where teachers were unable to significantly change the status quo.

Analytic statements 8 – 13 were aimed at the second research question: ***How can dialectical critical realism contribute to environmental education research?*** These reflected a methodological research interest and focused on the value of the MELD Schema in the

analysis of active learning processes, thus meeting the fifth goal of the study. Summatively, these statements argue that:

- A MELD analysis offers an explanation of active learning as a diachronic, emergent and open-ended process. Through highlighting the learning processes that can underpin 4D actions at the level of 1M, 2E and 3L, the MELD analysis elaborated on environmental education's explicit interest in: "problem-solving", "critical action" and "ways of doing things differently" (O'Donoghue et al., 2007: 7 – Section 3.3); and action competence calling for actions (direct or indirect) that are conscious and targeted at environmental issues (Jensen and Schnack, 1997 – Section 3.3.2), and a view of change as transformative praxis with a developmental rather than a behavioural change interest (Wals and Jickling, 2009 – Section 3.4), that does not have a goal directed insistence on solving society's problems (Jensen and Schnack, 1997 – Section 3.4). The MELD schema also provides insight into relational situated learning through reference to concrete universality and its dimensions of 4D concrete singularity, 1M universality, 2E processuality and 3L mediation.
- 1M non-identity enabled an understanding of the possibilities for active learning through a focus on stratified ontology (Bhaskar, 1998a – Section 5.2) and insight into "constraints on desires, wants, needs and interests" (Bhaskar, 1993: 175 – Section 2.2). A 1M analysis encouraged an exploration of how active learning processes are grounded in social-ecological conditions (illustrating a consistency with environmental education research which "sees humans as part of nature or the environment" (Lotz-Sisitka et al., 2012 - forthcoming: 6). The analysis also encouraged an exploration of "stratification of personality" (Bhaskar, 1993: 163 – Section 2.4), where the focus was on teacher disposition and qualifications.
- 2E negativity enabled a focus on how relational situational processes in emergent active learning processes contribute to an understanding of absence as process and the possibilities that these relational processes present in terms of understanding absence as a "dynamo of conceptual or social change" (Bhaskar, 1993: 175 – Section 2.2).
- A 3L focus on totality enabled insight into emergent active learning processes through understanding the role of "intra- and inter-subjective" relations (Bhaskar, 1993: 160 – Section 2.4) in value-based reflexive deliberations at the "nexus of competing and antagonistic ideologies" (Section 8.2.6) in the presence of epistemological relativism (Archer et al., 1998 – Section 2.1), thus giving insight into an environmental education interest in a search for new ways of "being and seeing" (Wals, 2009: 385 – Section 3.4) and an explicit counter-hegemony (Fien, 1993 – Section 3.3) within the context of the holistic whole.

- A 4D understanding of transformative agency enabled critical reflection on the nature and transformative potential of action-oriented active learning processes through highlighting “dialectical and entropic types of change” and “evolutionary and revolutionary” change (Bhaskar, 2010: 14 – Section 2.6.2) and by drawing attention to how the actions instigated by teachers and learners represented “thinking about how a situation of the world could be otherwise [new ways of seeing], with a change in the use of a given set of resources or with a different way of acting subject to certain constraints [new ways of being]” (Bhaskar, 2010: 22 – Section 2.6.3). 4D was also presented as emergent from the other dimensions of the MELD schema such as with the Bhaskar’s (1993) notion of **concrete singularity** (requiring sensitivity to local context at 4D), which is grounded in **universal** rights and freedoms at a global level (1M), conscious of **processuality** with the understanding that global concerns and interests will manifest in dynamic and changing ways at the local level (2E), and subject to **mediation** within and between the parts and the whole (3L) (adapted from Hartwig: 2007 – Section 4.2.3).
- A MELD analysis enabled an in-depth perspective on active learning processes amongst young learners through the illustration that young learners have a certain degree of capability to engage with change at all levels of the social cube (Bhaskar, 1993 – Section 2.4) and illustrates Shipway’s argument that learners can demonstrate degrees of rationality (2001 – Section 4.6.1).

The implications of the above-mentioned findings are discussed in the following section, thus addressing Archer’s insistence (1998b – Section 5.2) on the practical application of social research.

9.2 IMPLICATIONS FOR TEACHER PROFESSIONAL DEVELOPMENT:

ACTIVE LEARNING PROCESSES AND THE ‘KNOWLEDGEABLE TEACHER’

This section addresses the fourth (and final outstanding) goal of the research to: “Reflect on the implications of the transformative praxis potential of emergent active learning processes for environmental education in the context of contemporary South African curriculum changes”. The changes in question are discussed in the 2009 Curriculum Review (Dada et al., 2009) and give insight into the replacement of the RNCS with the CAPS for implementation in 2013, and the replacement of the *Norms and Standards for Educators* (South Africa.

Department of Education, 2000) with the *Minimum Requirements for Teacher Education* (South Africa. Department of Higher Education and Training, 2011) (Sections 1.3 and 4.3).

In order to be most useful in informing environmental education's contribution to teacher professional development in the new school curriculum and teacher qualification frameworks, this section has been structured according to four of the five types of learning for a knowledgeable teacher as outlined in the most recent *Minimum Requirements for Teacher Education* (disciplinary learning, pedagogical learning, practical learning, fundamental learning and situational learning) (South Africa. Department of Higher Education and Training, 2011 – Sections 4.3.3 and 4.3.4). The development of these five knowledge interests is based on an understanding that only a knowledgeable teacher can demonstrate reflexivity and responsiveness to different situations and that skills without knowledge can only produce technicist replication of performance across contexts (ibid.).

9.2.1 Disciplinary learning: Experiences in emergent active learning processes can inform an understanding of the role of environmental knowledge in specific subjects

This research has shown that skills within disciplines such as Mathematics and Language were very successful when integrated with disciplines with explicit environmental content knowledge (such as Natural Science, Social Science, Economic and Management Science and Life Orientation), however on their own they did not emphasise environmental knowledge foundations. Those disciplines with explicit environmental content might be the best 'home' for environmental education. Within the new CAPS framework, in the Foundation Phase, this would mean the subject of Life Skills which draws “content and concepts of Beginning Knowledge” from “Social Sciences (History and Geography), Natural Sciences and Technology” (South Africa. Department of Basic Education, 2011a: 8).

Environmental education teacher professional development programmes need to support teachers with the skills of knowing their own subject's expectations relative to their own knowledge, identifying knowledge gaps or absences (what they do not know in terms of knowledge gaps or conceptual clarity and where the textbooks fail to fill those gaps), and finding ways of filling these gaps. Such deliberations were raised by a workbook activity in Learning Unit 1 – described in Section 6.4.4). In the Schools and Sustainability Course, teachers accessed different types of knowledge in different ways. These were:

- “Expert” knowledge, for example, teachers drew on posters and textbooks for information on nutrition, Xoliswa drew on knowledge of permaculture from the non-

governmental organisation, Food and Trees for Africa, and Nokhanyo drew on my knowledge for help with making paper in her school. However there were cases where simple foundational environmental knowledge of ecology could have strengthened the lesson plans, for example, where Weliwe was concerned with killing snakes as a case of ‘fighting the environment’ (Section 7.2.2.4) she could have been supported through pictures of animals in a food chain (with snakes in the grass being eaten by birds of prey and mice being eaten by snakes).

- Local knowledge, for example from one’s own community, as in the case where Nomonde drew on knowledge of local experts to include ostrich manure as a natural fertiliser in the soil; or where Mhizana drew on local knowledge about wild vegetables).
- Media knowledge such as provided by newspapers and radio. The teachers in this study indicated practices which included using the Internet to find more information (Section 6.4.4), and newspapers and radio for following environmental concerns in national media (Section 6.4.8); however there was no evidence of these used in their lesson plans. These skills can be further developed exploring expanded opportunities for situated learning through encouraging Internet-based cultural exchanges via blog-sites, email, or other sites designed for cultural exchanges amongst youth or teachers.

The next question with respect to such knowledge resources is: In what way will learners use them? A general curriculum aim in the CAPS curriculum presents an interest in developing learners that can “communicate effectively using visual, symbolic and/or language skills in various modes” (South Africa. Department of Basic Education, 2011a: 4). This means that teachers need training in incorporating literacy and numeracy skills from Languages and Mathematics for strengthening critical environmental information literacy when dealing with specific topics in the Life Skills subject. Critical environmental literacy skills have been illustrated in this study, for example, by the role played by Mathematics pictographs in strengthening enquiries about nutrition, or the role played by the Home Language emphasis on thinking and reasoning (such as working with similarities and differences in comparisons between healthy and unhealthy gardens).

This research also has relevance for later years of schooling, where the CAPS separate out a number of knowledge fields across different subjects. The argument above emphasises the integration of literacy and numeracy **skills into** the Life Skills subject, but **knowledge** also needs integration across science subjects through emphasis on interdisciplinarity (Bhaskar, 2010 – Section 4.5.2). Traditionally, neither Natural Sciences, with an emphasis on ecological understandings of how the world works, nor Social Sciences with an emphasis on human use

of and impact in the world, entirely capture the notion of social-ecological relationships which are central to environmental learning (Hattingh, 2004; Parker, 2010 – Section 1.6). Thus Lacey and Lacey call for the re-institution of Science where “the forms science takes and the kinds of questions it addresses, could be determined in collaboration with social movements and reflect their values and experiences” (2010: 197 – Section 4.2.3). With the RNCS “awareness of the relationship between human rights, a healthy environment, social justice and inclusivity” was **integrated in** each learning area, and there was fluidity and possibilities for **integration across** learning areas (Section 1.3). As such, it was well-placed for developing social-ecological perspectives in learners. For example, in the teachers’ lesson plans the scientific argument for eating healthily was an important foundation for understanding food security – an understanding that was deepened by drawing on human-environment relationships as explained by the historical and geographical knowledge in the social sciences.

Section 4.4 points out the CAPS interest in infusing “principles and practices of social and environmental justice and human rights” which presents a similar transformational intent to the RNCS, but it notably no longer explicates the **relational** aspect of these issues. However, as one of its specific aims, the CAPS Foundation Phase subject calls for “understanding of the relationship between people and the environment” (South Africa. Department of Basic Education, 2011a: 8). Life Skills, as one of three subjects in the CAPS Foundation Phase allows for fluid boundaries between knowledge fields in its suggestion to use “topics ... as a means to integrate the content from the different study areas where possible and appropriate” (South Africa. Department of Basic Education, 2011a: 14 – Section 4.5.2). The challenge for environmental educators is to help teachers to emphasise the relational specific aim without reverting to the problem that cross-cutting themes tended to detract from furthering the “aims of the learning area” and “deepening of knowledge or process skills from specific learning areas” (Lotz-Sisitka & Raven, 2001 – Section 1.3). One way of mitigating against this problem is to focus environmental work by searching for environmental learning requirements within specific subjects. This is as opposed to imposing environmental interventions (such as are typical with a technicist/behaviourist approach to education), with a view of an overly passive agent (Section 4.2.1) in a way that undermines the educational project (Section 4.2.4). This is re-iterated by Lotz-Sisitka’s recommendation to work inside the curriculum (identifying and working with environmental learning requirements in the curriculum) rather than adopting an “outside-in” approach (Lotz-Sisitka, 2011: 18). This would include searching for foundational environmental concepts that need

strengthening and understanding in the different subjects (Lotz, 1996; Schreuder, Reddy, & le Grange, 2002; Vogel, 2012; Shava and Schudel, 2012 – Section 4.5.3).

Another consideration regarding environmental knowledge in the different disciplines is its applied nature as elaborated through an action oriented approach to active learning. Environmental educators need to look for places where appropriate ‘how-to’ knowledge (Section 8.2.7) is made explicit or could be elaborated in order to enable teachers to support the application of knowledge in practice.

Finally, the role of local knowledge in enriching environmental knowledge needs to be considered. Local knowledge needs to be related to abstract school knowledge in a way that enriches rather than compromises the conceptual depth required for a particular school subject or grade, and which does not lead to local conservatism (Section 3.4) or compromise epistemological access for learners (Lotz-Sisitka, 2009 – Section 3.4). For example knowledge of indigenous vegetables needs to be related to abstractions such as the nutritional value of food (in Natural Science), and/or changing agricultural practices over time (in Social Sciences – History or Agricultural Science), and/or natural resource use (in Social Sciences – Geography).

9.2.2 Pedagogical learning: Experiences in emergent active learning processes can strengthen the way in which environmental knowledge is learned generally and in specific subjects

Section 4.3.3 outlines the definition of pedagogical learning in the new *Minimum Requirements for Teacher Education* as essentially about *how* knowledge is to be learned. In Section 3.3.3 distinctions between different types of learning from within environmental education literature were highlighted. That is, between minds-on and hands-on, cognitive/affective and movement/speech, and learning and doing. The former in each of these dualisms can be associated with theory and the latter with practice. Section 3.3.2 highlighted that environmental learning needs to be about iterative relations between these, thus creating a unity of theory and practice in practice (transformative praxis) (Section 2.6.4), as does Section 8.2.2 which develops an understanding of active learning as a process which develops an iterative relationship between learning and doing, and Sections 8.2.6 and 8.2.7 which highlight active learning as a process of finding new ways of “being and seeing” (Wals, 2009: 385 – Section 3.4). Considering the five knowledge interests listed for teachers, there is a notable silence on the need for teachers to develop strategies for developing skills amongst learners for applying knowledge. The CAPS curriculum states the importance of

learners being able to “acquire and apply knowledge and skills in ways that are meaningful to their own lives” (South Africa. Department of Basic Education, 2011a: 4). However, the emphasis in pedagogical knowledge is for teachers to know “how to represent the concepts, methods and rules of a discipline in order to create appropriate learning opportunities for diverse learners, as well as how to evaluate their progress (South Africa. Department of Higher Education and Training, 2011: 11). This omits to emphasise the importance of applied knowledge for **learners** and implies a focus on skills to ensure that learners are able to assimilate knowledge rather than develop skills to apply these or put them into practice. This implies a reverting in the South African curriculum to teaching that represents Stevenson’s criticism of education concerned with “passive assimilation and reproduction of simplistic factual knowledge and an unproblematic 'truth'” (1987: 69 – Section 4.5.1).

This research has highlighted the difficulties experienced by teachers working in a content-poor curriculum (Section 8.2.5), but at the same time the value of skills for applying and deepening knowledge in context, particularly enquiry skills such as: investigate, collect, sort, think and reason (Section 8.2.5) and value-oriented skills such as making informed choices (Section 8.2.6). This indicates that environmental education’s involvement in teacher professional development needs to ensure that the value evident in developing skills for applying and deepening knowledge is not lost in a potential pendulum swing towards uncritical transmission of knowledge. The argument for critical engagement with knowledge and normative frameworks is supported by a quote from Dada et al. (2009: 61) that:

What we need to provide is a clear statement of the ‘powerful knowledge’ that provides better learning, life and work opportunities for learners, especially for teachers who have been dispossessed in the past, who are insecure in the present and uncertain of the future.

It is important not to lose sight of the significant changes in pedagogical thinking amongst teachers through engagement with Curriculum 2005 and RNCS, despite its many criticisms. Such changed thinking is evident in the quote from a teacher below:

They [learners] are able to demonstrate their skills and what they are capable of doing. They can demonstrate how they understand certain things and through that I think their talents will develop. We were taught to memorise things without understanding them. But these ones do not memorise, they create things because we are trying to encourage every child’s creativity (Nelson Mandela Foundation, 2005: 83).

Sections 8.2.5 and 8.2.6 highlighted curriculum elaborations needed in the RNCS in order to support enquiries (through the development of qualitative and quantitative investigative skills and the tools to support these) and value-based reflexive deliberations (through strategies for deciding on a way forward in the light of complex laminated totalities). Considering the

different enquiry modes and data representation methods across learning areas (summarised in Section 7.3), it would be important to investigate what these modes of enquiry and representation methods are in the new CAPS documents. For example, the Life Skills CAPS call for the development of “scientific process skills; the process of enquiry which involves observing, comparing, classifying, measuring, experimenting, and communicating” (South Africa. Department of Basic Education, 2011a: 8). Towards elaborating on such enquiries, this research has quality examples of appropriate contexts in which to develop these enquiries (with respect to nutrition, waste management and water and sanitation issues), of qualitative and quantitative data collection tools (for example, the dump site questionnaire and audit sheet for exploring nutrition in the community respectively), and methods for representation (such as pictographs reporting on food eaten by learners). However, the research indicated that teachers and learners can struggle with knowledge explaining what they find in an enquiry, or interpreting data once represented, for example, in a graph (Section 8.2.5). Thus a focus on all of these aspects of enquiry is important if teacher professional development is to contribute to transformative praxis. This means teachers developing understanding of the mode of enquiry as elaborated by a specific subject, developing subject appropriate qualitative and quantitative tools (questionnaires, interview schedules, observation sheets, photographs and pictures) to use with learners, knowing how to represent data in different ways (pictures, maps, reports, graphs, tables and more) and how to interpret these representations.

9.2.3 Practical learning: A spiral approach to cluster-based teacher professional development can strengthen reflexivity in active learning processes

The *Minimum Requirements for Teacher Education* highlight the importance of practical learning where teachers learn in their own practice and from other practices (learning in context/s) (South Africa. Department of Higher Education and Training, 2011: 9). This implies a reflexive approach to teaching. Teachers in the Schools and Sustainability Course appreciated the importance of reflexivity in developing quality education. However, one teacher argued that because of years of experience and lack of time, she teaches spontaneously and instinctively without having the time to elaborate and reflect in written lesson plans (Section 6.4.8). With lesson plan elaboration no longer a requirement for teachers (Section 1.5), teacher professional development programmes could benefit from more intensive and less onerous (than detailed lesson plans) ways of explicitly encouraging reflexivity amongst teachers.

The Department of Education teacher clusters tended towards a managerial interest in the technical requirements of implementing the new curriculum within a complex three tiered system for curriculum planning (Section 1.5). The spiral approach to the cluster-based model used in environmental education teacher professional development and in the Schools and Sustainability Course (Sections 1.5 and 6.3.2) modelled a reflexive process of progressively deepening teacher knowledge and skills through a series of practical work-together and work-away tasks (Section 6.3.2.1 and Figure 6.3) which were valued by teachers in terms of problem-solving through peer collaboration in and across contexts (Section 6.4.7.3), tutor and partner support (Section 6.4.7.4), and case studies (Section 6.3.2.3). This was in the spirit of a progressive model interest in greater professional autonomy, flexible competences, and teaching as situated, interpretive and contextual where teachers are supported to “ask questions, evaluate evidence, defend arguments, and apply ... knowledge to new situations” (Taylor, 1999: 111 – Section 4.3.2). The work-together and work-away tasks and regular meetings in the Schools and Sustainability Course (Figure 6.3) enabled teachers to bring issues and problems (both socio-economic and pedagogical, and practical and conceptual) for discussion with the group. The spiral model supported features of teacher professional development as described in Sections 4.4 and 6.3.2.1 in the following ways:

1. Contextualisation and flexibility: Teachers worked with challenges from their own socio-political, biophysical and educational contexts. This was developed through the use of the picture-scope activity in Learning Unit 1 and evident in the choice of three different environmental foci amongst the six teachers.
2. Constructivism: The constructed nature of knowledge was also acknowledged, for example, through involving learners in enquiries in their own contexts (inspired by Learning Unit 2) and involving parents in contributing knowledge, for example, about composting techniques and practices and the use of wild vegetables in traditional diet (Sections 7.2.5.1 and 7.2.5.4 respectively). There were cases where teachers were challenged to apply judgmental rationality in the face of judgmental relativism (for which the course had not prepared them – Analytic Statement 4), for example the teacher who used the argument of ‘not fighting nature’ in the face of a belief amongst her colleagues that grass should be burned to get rid of snakes (Section 7.2.4.4).
3. Participation, dialogue and democracy: Teachers were able to offer their own perspectives and curriculum challenges particularly through deliberating environmental learning opportunities (Section 6.4.1), deliberating the knowledge focus (Section 6.4.2), deliberating methods (Section 6.4.3) and deliberating assessment challenges (Section 6.4.5). Also, teachers worked together to produce creative lesson plans, for example as evidenced in the creation of stories to represent social-ecological complexities (Section 6.4.4).

4. Reflexivity and integration of theory and practice: In the Schools and Sustainability Course teachers demonstrated reflexivity by relating course emphases on information, enquiry, action and assessment to their own curriculum needs (Section 6.4.1) as well as environmental projects in their schools (Figure 6.6). They put these ideas into practice by designing appropriate lesson plans for assessment purposes which incorporated these ideas. A reflective element was integral to the Schools and Sustainability workbook activities (which also became an important source of evidence for this research – Section 5.6.4a) as well as the assessment task as evident in Table 6.1 where, for each lesson plan, teachers were expected to include “Examples of learners’ work with reflections on their work”.
5. Integration of theory and practice: Teachers discuss theories and ideas in cluster meetings and try these out in practice. The integration of theory and practice modelled an iterative process between learning and doing in active learning approaches to learning.
6. Development of sophistication of meaning: Sophisticated understandings of social-ecological complexities were encouraged through local enquiries in Learning Unit 2 and these manifested as relational situated learning processes at the implementation phase – Analytic Statement 5).

9.2.4 Fundamental learning: Quality active learning processes will depend on teacher professional development which takes cognisance of fundamental language and communication skills

The *Minimum Requirements for Teacher Education* specify the fundamental learning knowledge interest as inclusive of communicating in a second language (South Africa. Department of Higher Education and Training, 2011). In the context of the Schools and Sustainability Course, the language challenge for teachers was a different one. This research emphasises the argument for the use of Home Language as the language of teaching and learning in the Foundation Phase (Section 4.6.2). The skill of thinking and reasoning from the Home Language Curriculum proved a useful guiding learning outcome for developing critical environmental literacy in the Schools and Sustainability Course, particularly in explaining how issues came to be, which are critical to understanding environmental complexity (Section 8.2.5). It is logical that deeper and more complex understandings can be developed in a language with which a learner is comfortable and familiar (South Africa. Department of Education, 1997b – Section 4.6.2).

However, sometimes Home Language (Xhosa) needs to be related to abstract concepts which are not exclusively but predominantly communicated in English (a second language for the Schools and Sustainability teachers and their learners). For example, the notion of natural recycling needed to be related to the traditional practice of composting (Section 7.2.1.3). Also, teachers faced problems with translations which may have led to incorrect understandings, such as the implication that tuberculosis is one of the germs spread through litter, perhaps due to a translation of the Xhosa word for tuberculosis "isipho sepepha" (the disease of paper) (Section 8.2.5).

Foundation Phase teachers need to be able to translate environmental information from posters and other sources into the learners' Home Language at the appropriate level. An example of such a complex task is evident in Nokhanyo's lesson plans where she needed to relate recycling to environmental health and where she was supported through a life cycle analysis provided in a district workshop (Figure 6.8) in response to an implicit understanding that teachers will be able to make the necessary links between recycling and environmental health (Table 7.1). Evidence of relatively simple links is presented in PLATE 3: Photograph 12 – translated in Section 7.2. 1.4). Even though the assumption is that the textbook will do much of this work for teachers considering the imperative set by the 2009 curriculum review for a re-emphasis on the importance of using good textbooks in teaching practice (Dada et al., 2009 – Section 4.5.3), there is still the concern that environmental topics new to subjects, such as biodiversity to biology or climate change to Geography, may not be adequately covered by textbooks and will need elaboration by teachers (Lotz-Sisitka, 2011). While data related to the practice of only a few, relatively well-qualified and motivated teachers presented in this study, it does present a positive scenario that there are teachers that have the disposition and the capacity to lead such explorations, supported by professional development programmes such as the Schools and Sustainability Course.

9.2.5 Situational learning: Active learning processes designed with knowledge of context can extend teachers' knowledge about context

Related to practical learning (learning *in* context), the *Minimum Requirements for Teacher Education* describe situational learning as learning *about* context with an interest in "knowledge of the varied learning situations, contexts and environments of education ... as well as prevailing policy, political and organizational contexts" (South Africa. Department of Higher Education and Training, 2011: 9). For example, Nomonde responded to the literacy levels of young learners with careful design and scaffolding of the audit of eating habits in the home (Section 7.2.3.4). In this way she demonstrated her ability to respond to knowledge of

context. Other teachers in this study showed similar abilities, and were proactively supported to do this through the emphasis on enquiry in Learning Unit 2 of the Schools and Sustainability Course.

In keeping with the CAPS interest in “grounding knowledge in local contexts” (South Africa. Department of Basic Education, 2011b: 3 – Section 4.5.5), this study has shown that teachers can deepen and respond to knowledge *about* context, through active learning processes conducted **with learners**. For example, Nomhle and Nomonde’s lesson plans focusing on the context of hunger in their classrooms despite legislated children’s rights to basic human needs, was followed by a deepening of this knowledge *in* context (how many learners were not receiving sufficient food or a sufficient variety of food) through auditing processes and response to this knowledge. In Nomhle’s case this occurred through helping families to organise social grants and to start vegetable gardens (Sections 7.2.3.4 and 7.2.3.5).

The identification of learners in need raises an ethical issue about exposing those learners’ personal circumstance in the classroom. Thus, teachers need to conduct investigations with learners in ways which will not result in learners feeling more vulnerable or disempowered. This is an issue of ‘inclusivity’ as raised in the RNCS first principle and which was highlighted for teachers in a case study in which the point was made that if the topic of energy supply and its associated pollution were taught “to a class which includes the children of Eskom employees, in such a way that they feel discriminated against”, the principle of inclusivity in education would have been violated (Figure 6.5).

9.3 IMPLICATIONS FOR TEACHER PROFESSIONAL DEVELOPMENT IN PREPARING TEACHERS FOR DIFFERENT ROLES IN THE SCHOOL

In addition to the knowledge interests described above, this section considers the seven roles of educators (South Africa. Department of Education, 2000 – Section 4.3.3) which were influential in the design of the Schools and Sustainability Course (Table 6.5). In the *Minimum Requirements for Teacher Education*, these are no longer framed as a list of roles for individual educators, but as a list of important collective roles to be shared amongst teachers within a school (South Africa. Department of Higher Education and Training, 2011 – Section 4.3.3). Although these numerous roles may present an inflated view of the capacity of teachers (Morrow, 2007 – Section 4.3.3), evidence was presented that teachers who are well-disposed and educated can take on these roles (Sections 7.3 and 8.2.1). The implications of

focusing on these roles in future environmental education teacher professional development programmes are discussed below:

9.3.1 Teacher as learning mediator and learning area/subject/discipline/phase specialist

Two educator roles, namely ‘learning mediator’ and ‘learning area/ subject/ discipline/ phase specialist’ are important in teacher professional development for developing teachers’ capacity to provide a variety of learning opportunities (as learning mediators) in a way that ensures the development of subject knowledge at the appropriate scope and depth (as subject specialists). This is especially significant with the *Minimum Requirements for Teacher Education*’s call for “renewed emphasis to *what* is to be learned and *how* it is to be learnt” (South Africa. Department of Higher Education and Training, 2011: 7 – Section 4.3.4) as well as the re-emphasis on knowledge-based learning in the CAPS (Dada et al., 2009: 47 – Section 1.3). In this context, the role of information-based teaching strategies will become increasingly important. As shown in this study, from an environmental learning perspective, this means focusing on the **information** dimension of active learning processes in ways that are:

- Relationally situated to help learners to understand the social-ecological complexity of environmental issues (Section 8.2.5).
- Deliberative and co-engaged in order to support value-based, reasoned and applied decision-making in response to absences and ills (Section 8.2.6).
- Transformative in that deliberations include critical engagement with normative questions (Section 8.2.6).
- Transformative with respect to “how-to” knowledge on alternative practices to support action-oriented approaches to active learning in order to support iterative processes between learning and doing (Section 8.2.7).

A deliberative, co-engaged and transformative nature of knowledge construction as proposed above, which is also founded on a carefully constructed information base, will ensure that active learning processes emerging from the new CAPS curriculum will have the potential to support critical engagement with knowledge. That is, knowledge construction beyond a simple “‘internalisation’ of knowledge” (Bernstein, 1999 in Sadovnik, 1995: 11 – Section 4.3.1), and caveat to constructivism (Section 6.3.2) in which ‘reality is constructed in the minds of learners, but is open to critique and which needs to “stand up to tests of truth and normative judgements” (Lotz-Sisitka, 2008; Brown 2009 – Section 3.4). Such knowledge also needs to see “the truth of or reason for *things* and phenomena, *not propositions*, as genuinely

ontological, and in this sense as objective in the intransitive dimension” (Bhaskar, 1993: 217 – Section 2.6.1). This responds to problems of naïve constructivism (Moll, 2002 – Section 4.2.3), where “school knowledge is totally submerged in an unorganized confusion of contrived realism” (Taylor, 1999: 121 – Section 3.4).

Section 4.4 highlights the CAPS interest in learning that is meaningful to learners’ lives: “the importance of grounding knowledge in local contexts, while being sensitive to global imperatives” (South Africa. Department of Basic Education, 2011b: 3 – Section 4.5.5). This highlights the value in pursuing active learning processes with an emphasis on local **enquiry** and the role of teacher professional development in developing the teacher as a ‘learning mediator’ and ‘subject specialist’ to enable rigorous application of natural science and social science enquiry methods. This means giving attention to qualitative and quantitative data collection tools, methods of representation and the development of interpretation skills as applied in the different subjects (Section 8.2.5).

As shown in this study, from an environmental learning perspective this means focusing on the **enquiry** dimension of active learning in a way that is:

- Situated in relation to abstract school knowledge, stratified reality, national and global perspectives, and tensed socio-spatialising processes (Section 8.2.5).
- Deliberative in order to deal with contradiction/dissonance, false beliefs and frustrated needs that might arise out of enquiries (Section 8.2.6).
- Co-engaged in order that learners might draw on local knowledge (Section 8.2.5).

9.3.2 Teacher as assessor

Another role important for teachers is that of ‘assessor’. As shown in this study, the ability to assess descriptive knowledge of the nature of issues and explanatory knowledge of how issues came to be (based on knowledge of root absences and absencing processes) is important (Section 8.2.5). Assessing knowledge describing the nature of issues would entail breaking knowledge up into smaller grade-appropriate units, for example, explaining why we need a balanced diet, or why plants can’t grow on degraded soil and how compost can improve it. The CAPS document is more explicit than the RNCS in terms of assessment and might tend towards a ‘performance-based model’ concerned with ‘specific knowledge and skills and well-defined criteria of ‘right and wrong’ with an assessment that is “atomistic, explicit and measurable” (Harley & Parker, 1999: 184 – Section 4.3.1). As shown in this study, it will be important for teachers to have knowledge of foundational ecological principles in order to help learners understand the nature of environmental concerns, but it is the ability to apply

these principles in specific environmental contexts – such as explaining how the principle of ecological limits can be applied to explain the value of compost in increasing water retention, aeration, nutritional value and microbial activity in the soil.

Assessing knowledge of how an issue came to be requires the ability to explain the social-ecological complexities of environmental issues (such as the effects of poverty, soil degradation and drought on food security). As revealed in this study, this latter type of knowledge requires, for example, assessing learners' ability to engage in value-based reflexive deliberations towards informed choice (Section 8.2.6). This means an assessment which is "holistic, tacit and inferential" (Harley and Parker, 1999 – Section 4.3.1) in order to assess critical thinking skills. For example, in the Foundation Phase, assessing the ability to 'think and reason' can be elaborated as an ability to compare similarities and differences (as with Nomhle's garden comparison – Section 7.2.4.3), or the ability to 'explain' a chosen action might be explored through poetry highlighting cause and effect (as with Nokhanyo's 'poetry' exploring waste – Section 7.2.1.3).

This study provided evidence of informal assessment of value-based reflexive deliberations (such as the learner in Weliwe's class that would not let his peers kill a praying mantis or the decision to use grass in the compost heap rather than burn it along with the snakes that lived in it (Sections 7.2.2.4 and 8.2.6). The study also pointed out the limitations of unjustified judgement, for example, on whether litter is 'good or bad' (Section 8.2.6) which points to a need to support teachers to design assessment activities in such a way that learners' are enabled to justify their value-judgements.

Having specified that it is not the role of education or environmental education to solve society's problems (Jensen & Schnack, 1997 – Section 3.4), the teacher in the role of **assessor** should not be judging learners against whether they have made improvement in the world or not. However, she does need to know, recognise the subtleties of, and have the capacity to assess the development of critical faculties that enable learners to critically evaluate, make choices, and propose solutions; in a way that supports judgmental rationality in the presence of "epistemological relativism" (Archer et al., 1998 – Section 2.1). She also needs to know how to assess a rationality that is grounded in 'real but non-actualised possibilities' (Bhaskar, 1998b – Section 2.6.3). Such judgmental rationality needs to be guided in an environment which is open to challenging normative frameworks affecting the status quo (Lotz-Sisitka & Schudel, 2006 – Section 3.4). In other words, transformative praxis as an educational goal is not assessable, but iterative processes between learning and doing leading up to transformative praxis are (Sections 8.2.2 and 8.2.7).

Another important skill for the assessor in working with the CAPS is the question of sensitivity to literacy in the Foundation Phase. For example, as learners begin to move to working with English as the language of learning towards the end of the Foundation Phase (Section 4.6.2), creative techniques for scaffolding assessment activities need to be developed. An example is Weliwe's scaffolding of language learning by asking learners to answer orally in English while she wrote down their answers for assessment purposes (Section 8.2.5).

9.3.3 Teacher as leader, administrator and manager with a community, citizenship and pastoral role

Another two roles relate to teachers' ability to enable school-based environmental projects, school environmental policies and interdisciplinary learning in response to complex environmental issues. These are 'leader, administrator and manager' and 'community, citizenship and pastoral role'. While acknowledging warnings about practicalities in schools and the inflated role of teachers (Section 8.2.7), and not expecting teachers to take on the role of feeding undernourished children, or directly tackling infrastructural problems affecting sanitation and health; it is important that teachers as a collective raise consciousness in communities about inequalities and injustices. It is possible to envisage them involving learners in small, manageable, and developmentally (rather than behaviourally) directed transformative praxis (involving the unity of theory and practice in practice – Section 2.6.4 and 8.2.7) that has the potential to make significant changes in learners' action competence (Sections 3.3.4, 3.4 and 8.2.7). This study has shown that, if supported to do so (as in the case of the Schools and Sustainability Course), teachers can develop an action dimension in active learning processes that is first and foremost educational and that, secondarily, contributes to small-scale change in the school and community. This addresses the dualistic assumption raised in Section 8.2.2 that teaching needs to be either in the classroom or in the school grounds with the associated assumption that it is educational in the former and exploitative in the latter.

In the Foundation Phase, the scope and scale of projects needs particularly carefully attention as demonstrated by Nomhle when starting a smaller and separate garden for the Grade 1s (Section 7.2.4.4) and who illustrated the potential of projects to serve as a context for learning instead of as an expected outcome of learning (Section 8.2.7); or by Nomonde who had the challenge of not expecting the Grade 1s to handle large tools necessary for starting a garden.

9.3.4 Teacher as scholar, researcher and lifelong learner and interpreter and designer of learning programmes and materials

As shown in this study, the final two roles: ‘scholar, researcher, lifelong learner’ and ‘interpreter and designer of learning programmes and materials’ are relevant to the application of learning in local and changing contexts (such as making choices about how to best manage waste; for example, burn, re-use, recycle and/or reduce), and changing knowledge (such through the mobilisation and the re-valuation of local knowledge about wild vegetables, or new technologies such as water harvesting or alternative energy). This is consistent with teacher education requirements that, along with the ability to use provided learning programmes, teachers should be able to “design original learning programmes” (South Africa. Department of Higher Education and Training, 2011: 52). This implies a teacher that can demonstrate autonomy and reflexivity in her application of knowledge. As shown in this study, this applied knowledge is essential in active learning processes where teachers need to help learners with steering questions such as what we know, what we need to find out, what ultimately we know at the end of the process, and how this knowledge has contributed to sustainability practices (Section 3.2).

9.4 RECOMMENDATIONS FOR TEACHER PROFESSIONAL DEVELOPMENT

The previous two sections have focused on elements of teacher professional development pertinent to the changing teacher qualifications in South Africa as outlined in the 2011 minimum requirements for teacher education. The concurrent changes in the CAPS school curriculum also present some key challenges for environmental educators focusing on teacher professional development. These challenges are considered in the following sections focusing particularly on the Foundation Phase (as this was the focus of this study) but also reflecting on other curriculum phases, where appropriate.

9.4.1 Exploring environmental learning in the CAPS

Life Skills is the key knowledge-based subject in the Foundation Phase. It is this subject where extensive environmental learning needs are made explicit, for example it addresses “issues relating to nutrition, diseases (including HIV/AIDS), safety, violence, abuse and environmental health” (South Africa. Department of Basic Education, 2011a: 9). However, the other two subjects also have explicit environmental learning needs, for example Home Language requires Grade 1 learners to read “logos, labels and other words from environmental print” (South Africa. Department of Basic Education, 2011b: 26). Foundation Phase teachers, because they teach all subjects, are well-placed to teach in an interdisciplinary manner. They have the opportunity, for example, to develop activities where learners identify

‘badger friendly’ honey or ‘dolphin friendly’ tuna in logos and link that to ‘environmental health’; or activities where learners see how many labels they can find with the word ‘monosodium glutamate’ (common in South African foods) and link that to a discussion on nutrition and disease. Home language also requires learners to “interpret pictures and other print media” (South Africa. Department of Basic Education, 2011b: 26). As shown in this study, such possibilities exist, for example, the arranging and labelling of composting or paper-making processes (PLATE 4: Photograph 14), integrated with a basic scientific understanding of how these activities link to environmental health would provide a critical interdisciplinary environmental learning opportunity. In Mathematics learners are required to collect, represent and analyse data (with an emphasis on pictographs) (South Africa. Department of Basic Education, 2011b: 38). This research has provided evidence of how this can be integrated with explorations of water waste, eating habits and waste reduction (Section 8.2.5).

From this it is possible to recommend that teacher professional development needs to highlight language and mathematical skills in lesson plans in order to deepen Life Skills subject knowledge in the light of the complexity of environmental concerns. This will serve to enhance the meaningfulness of Languages and Mathematics for learners and ensure that environmental learning is not considered as the ‘easy’ or ‘filler’ work delegated to an end of day or end of year time slot. Particularly, the use of Home Language that deepens potential for critical environmental literacy and for cultural-historical enrichment in understanding environmental complexities, is important to highlight. As was demonstrated in this study, teacher professional development in the Foundation Phase will need to focus on finding teaching strategies (such as investigations, story-telling, picture drawing and interpretation, and poetry) to work with young learners to begin to understand and deliberate these complexities.

In other curriculum phases, the possibility for interdisciplinarity is compromised with an emphasis in the CAPS on distinct subjects and a split between natural sciences and social sciences. Because of the educational crisis in South Africa, the many changes to which teachers have needed to adapt since 1995, and the reported compromised conceptual learning and progression in subject knowledge (Sections 1.3, 1.4 and 4.4); environmental educators would be best placed to work in a supportive manner with the new curriculum emphasising social-ecological interrelationships from **within** different subjects (Section 9.2.1) – that is in order to support the new focus on subject knowledge (Motshekga, 2010 – Section 1.3). For example a re-institutionalised science which embraces a discourse not only driven by scientific ‘experts’ and imposed values derived from this discourse (Lacey & Lacey, 2010 –

Section 4.2.3) can be considered where Grade 8 Natural Sciences requires learners to address a “current environmental issue in the community, for instance, use of pesticides, ...” (South Africa. Department of Basic Education, 2011c: 52). Without a human rights and social justice perspective learners would not be able to engage the debate, still significant in Africa, over the use of DDT to combat the high prevalence of infant deaths due to Malaria (World Health Organisation, 2011).

9.4.2 Working with a knowledge-focused curriculum

With a re-emphasis on knowledge in the CAPS and new teacher qualification requirements, environmental education teacher professional development programmes can support teachers to explore what environmentally-focused topics and concepts they do not know or understand in their subject areas (Lotz-Sisitka, 2011) as teachers were supported to do in Learning Unit 1 of the Schools and Sustainability Course (Section 6.4.4). This can help teachers to develop an understanding of foundational concepts such as those explicated by Lotz (1996 – Section 4.5.3). As shown in this study, teachers need to know how to help learners view and apply knowledge critically through consideration of normative frameworks in society and through focusing on the implications for choices and decisions in relation to the holistic whole (Section 8.2.6). This is particularly important in environmental contexts consisting of complex “laminated totalities” (Bhaskar, 2010 – Sections 2.6.2 and 8.2.5) and where knowledge is “contested, not certain or not available” (Lotz-Sisitka, 2012: 20 – Section 4.5.4). As demonstrated in the Schools and Sustainability Course programme (Section 9.2.3), environmental education professional development programmes will need to support the development of autonomous and reflexive teachers committed to research and to expanding given learning programmes in order to deal with these complexities.

This approach requires careful consideration of assessment. With assessment tasks clearly defined in the CAPS, environmentally-focused assessment tasks need to be reviewed for how they expect learners to work with foundational ecological knowledge (such as the value of biodiversity or ecological principles) or social-ecological relations such as those highlighted by life-cycle analysis or economic cycles. Consideration needs to be given to how holistic, tacit and inferential assessment can be applied to acknowledge and support critical thinking with its associated complex reasoning and ethical deliberations. As shown in this study, with young learners, creative ways of assessing information (such as oral feedback), enquiry (such as pictographs) and action (such as arranging pictures of the action) activities need to be developed.

9.4.3 Developing relational situated learning processes for meaningful application of local knowledge and experience

As shown in this study, the CAPS requirement for learners to acquire and apply knowledge and skills meaningfully through grounding knowledge in local contexts (Section 4.5.5), can potentially be strengthened through teacher professional development programmes which situate local knowledge and experience in relation to abstract school knowledge, to a depth understanding of absence (showing cognisance of stratified reality), to absence from national perspectives (global perspectives are not evident in the data), and to absence from tensed socio-spatialising perspectives (Section 8.2.5). The study has also shown how such contextual knowledge can be constructed through focusing on the different enquiry modes of specific subjects (Section 8.2.3) and developing subject appropriate qualitative and quantitative data generation tools; considering different, subject appropriate, forms of data representation; and developing capacity to interpret these representations (Section 8.2.5). Such work has begun in the South Africa Teacher Development Network – the consortium of environmental education teacher development organisations discussed in Section 1.2 – that is developing a series of exemplars for teacher development in the different subject areas. As highlighted in this study, such enquiries need careful scaffolding bearing literacy levels in mind (Section 8.2.5) and careful consideration of ethical implications of working with vulnerable learners when individual's personal circumstances become highlighted through local enquiries (Section 9.2.5).

Based on understandings of relational situated learning gained through this study, further teacher education programmes can include teachers in reviewing the new CAPS curriculum for opportunities where local knowledge can be appropriately situated in relation to a deep (stratified) reality in order to ensure depth understanding of environmental concepts in particular subjects. Such programmes can also look for opportunities for enriching abstract concepts through situating indigenous knowledge in relation to spatio-temporal realities. Furthermore, such programmes can also look for opportunities where local knowledge can help learners to gain perspective on national and global issues.

9.4.4 Supporting transformative praxis through the unity of theory and practice in practice

This study has illustrated the value of an iterative relationship between learning and doing (illustrating the unity of theory and practice in practice) in the context of school environmental projects (Section 8.2.7). In the Schools and Sustainability Course, such projects were linked to an explicit interest in action in the active learning framework

(considering its action dimension – Section 3.3.2) and the Schools and Sustainability course (Section 6.2). This was consistent with practice-based ideologies influencing environmental educators in South Africa (Ramsarup, 2005 – Section 3.3.2; see also Section 6.4.6). In some cases in this study, actions such as the indirect action of letter-writing (Section 8.2.5) or the direct action of recycling (Section 8.2.7) were explicitly linked to curriculum requirements, while in other cases, they involved elaborations by teachers on curriculum intentions such as ‘problem-solving’ (Section 8.2.7). Acknowledging the explicit (although not exclusive) interest in action in active learning processes, future teacher education programmes could include a review of the new CAPS curriculum for cases where projects such as paper-making, composting, or gardening could be used to strengthen curriculum requirements and conceptual understandings (as demonstrated in this study).

The study has argued that action projects need to be curriculum-related and developmental in nature (Wals and Jickling, 2009 – Section 3.4), but has shown that whole school processes involving parents and other community members have the potential to strengthen environmental projects beyond the classroom. That is, in two out of three cases focusing on nutrition, involving parents increased the garden’s capacity to supplement the school feeding scheme (Sections 7.2.4.4 and 7.2.5.4; and in another case community involvement addressed the problem of theft and vandalism in the school (Section 72.6.4). This can create an environment more conducive to learning, and strengthen opportunities for developing an iterative relationship between the project and curriculum needs. Whole school processes can also involve parents directly in learning processes (for example through sharing knowledge of cultural uses of wild vegetables – Section 7.2.5.3). To support whole school development in the context of South Africa’s Integrated Quality Management System (South Africa. Department of Education, 2002a; Rosenberg, 2009 – Section 3.3.3), future teacher professional development programmes could benefit from linking up with national programmes such as Eco-Schools – South Africa; which provides strategies such as learner-teacher-community involvement in environmental auditing, policy processes and project work (Rosenberg, 2009 – Section 3.3.3; Doc 5 – Section 6.3.3.2). However, considering the organising themes which structure the Eco-Schools programme, teachers and facilitators working in Eco-Schools contexts need to be conscious of the problems that have arisen regarding theme-based approaches to environmental learning (Lotz-Sisitka and Raven, 2001 – Section 1.3) as discussed above and acknowledge that, if environmental learning is to be organised according to themes, it must be done in a sophisticated manner that does not compromise the integrity of particular curriculum subjects.

9.4.5 A spiral approach to cluster-based teacher professional development

This study has highlighted the value of a spiral approach to cluster-based professional development in teachers, particularly in the development of reflexivity around both environmental and pedagogical complexities (Section 9.2.3). One teacher argued the importance of collegial development in teacher clusters developed across schools (Section 6.4.8). This enabled peers to work on a common problem and support each other (Section 6.4.7.3). This study also showed that teachers are dependent on their peers and the principal in their school. All indicated that they cannot support an environmental focus in the school alone and highlighted the importance of seeing an environmental programme as about the whole school and not for the individual teacher's benefit (Section 6.4.7.2). One of the teachers valued the fact that she played a lead role in inspiring her colleagues (Section 6.4.7.2). The study also identified the important role played by district officials in supporting teachers' work especially through personal visits and encouraging teachers to bring examples of their work to meetings.

This is significant considering the recent *Integrated Strategic Planning Framework for Teacher Education and Development in South Africa: 2011 – 2025* which stated that “at the local level, teachers, curriculum advisors and mentor teachers will be helped to form Professional Learning Communities to expand peer-learning opportunities among colleagues” (South Africa. Department of Basic Education and Higher Education and Training, 2011: 2). In the light of logistical and staffing challenges in district offices, these may seem a challenge to achieve. However, the approach, modelled by the Schools and Sustainability Course and earlier environmental education professional development programmes in the Learning for Sustainability and NEEP-GET (Section 6.3.2.1), has a number of benefits. As shown in this study, these benefits include peer support amongst teachers and external support through the cultivation of non-governmental, higher education institution and Department of Education partnerships.

9.5 CRITICAL REFLECTION ON THE RESEARCH PROCESS

In this study, dialectical critical realism with Bhaskar's ontological-axiological chain (MELD Schema) as a tool for analysing transformative praxis, has given deeper insight into the situated, deliberative and co-engaged and action-oriented potential of the active learning framework and the processes that emerged from its application in the 2008 Schools and Sustainability Course, thus responding to the first research question: *How do emergent active*

learning processes manifest as transformative praxis in the context of teacher professional development?

Regarding this question, the research has provided insight particularly into the Foundation Phase of the RNCS and active learning processes with young learners. It has suggested a reframing of an interest in action in response to environmental issue and risk to an interest in the processes that lead up to that action. It has presented environmental education as a “tensed socio-spatialising process” (Bhaskar, 1993: 160 – Section 2.4). This understanding is important in environmental education research because, without this understanding of society as emerging from a stratified ontological reality, change would be seen as an inflexible process determined by social structures. This perspective has enabled a nuanced vision of active learning that does not judge an educational process by its outcome but by the depth of the insights into absences (2E) and moral deliberations on totality (3L) and by the degree of reality congruence (1M) that leads to context-sensitive and expressively veracious transformative agency (4D).

The findings of the research have enabled a consideration of the implications for the CAPS which form the latest rework of the South African curriculum. Similar research into future CAPS curriculum engagement might focus on:

- The problem of increasing complexity of issues coupled with a focus on the reinstitution of science and the integration of knowledge fields within increasingly specialised school subjects (Section 9.2.1);
- How the knowledge-based curriculum can contribute to deepening understanding of absence and absencing processes (Section 8.2.5) in the context of environmental issues and risks;
- The implications of the transformative interest in the CAPS (Section 9.2.1) and how this might be integrated with a progressive interest in the autonomy of knowledge (Bernstein, 1990 in Sadovnik, 1995: 11 – Section 4.3.1);
- How the CAPS interest “that learners acquire and apply knowledge and skills in ways that are meaningful to their own lives” with regard for “grounding knowledge in local contexts, while being sensitive to global imperatives” (South Africa. Department of Basic Education, 2011: 3 – Section 4.5.5) can be engaged with consideration of the relational nature of situated knowledge and the notion of concrete universality (Sections 8.2.5 and 9.4.3).
- How whole school development (Shallcross and Wals, 2004 – Section 3.3.3) supporting active learning engagements in a spiral approach to cluster-based teacher

professional development (Section 6.3.2.1) might enhance reflexivity with professional learning communities (South Africa. Department of Basic Education and Higher Education and Training, 2011: 2 – Section 9.4) and improvement in the quality of teaching and learning.

This study drew heavily on **teachers' work** with reference to learners' work mainly as an illustrative tool, or in some cases learners' work was used for a retroductive analysis such as to propose, for example, that using English as a second language may have influenced learners' ability to reflect critically on the causes of environmental issues. More detailed classroom research and more detailed analysis of a range of learners' work, as well as interviews with learners could provide more insight into active learning processes as they experience and understand them at the levels of 2E, 3L and 4D in relation to their 1M ontological grounding. Section 5.9 reflected on the impression of homogeneity amongst tutors (including myself) conveyed in the research. Future research would benefit from a deeper analysis of not only teachers' contexts but also of tutors' contexts. This could give further insight into how tutors interpret and influence course processes, and how course ideologies are established and operationalised. This study has in part reflected on the manner in which the Schools and Sustainability programme was structured, but more in-depth analysis of its ideological and praxiological underpinnings may further deepen the MELD analysis presented here.

Reflection on the methodological decisions guiding engagement with the first question, informed the response to the second question: ***How can dialectical critical realism contribute to environmental education research?*** This methodological reflection illustrated the value of critical realism in understanding emergent active learning processes as: catalytic, strengthening, redirecting or reproductive; diachronic, emergent and open-ended; elaborative with respect to power relations, absences, absenting processes, reflections on totality and transformative praxis. It also gave insight into specific questions regarding young learners and their agency with respect to the cognitive, affective and performative domains at 2E, 3L and 4D respectively.

Bhaskar's (1993) notion of concrete universality has particularly helped to develop a perspective on environmental education research grounded in a relational situated understanding of environmental learning. This perspective takes cognisance of **concrete singularity** (being expressively veracious and sensitive to local context at 4D), **universal** rights and freedoms at a global level (1M), **processuality** with the understanding that global concerns and interests will manifest as a variety of spatio-temporal realities in dynamic and

changing ways at the local level (2E), and **mediation** within and between the parts (respectively highlighting environmental health, human rights, social justice and inclusivity) and the whole (social-ecological reality (3L) (adapted from Hartwig, 2007 – Section 4.2.3). This view of concrete universality (constituted by universality, processuality, mediation and concrete singularity) can be useful in environmental learning where “both environmental and educational issues are context-specific in time and space, and seldom amenable to universal solutions” (Janse van Rensburg & Mhoney, 2000: 47 – Section 3.2).

This research has played a role in examining the possibilities offered by dialectical critical realism for deepening environmental education research as well as for examining the emergence of active learning processes as transformative praxis. The scope of the thesis is, however, limited in terms of examining philosophical discontinuities amongst the visionaries and applied researchers within the field of critical realism, as well as in terms of examining critiques of critical realist philosophies. This would be an important focus for further research into the possibilities and potential pitfalls of critical realism as a methodological and pedagogical lens.

Bhaskar’s work is known for its complexity, so I limited myself to reading of his work and close commentaries on his work for this applied study. Towards the end of the thesis as I became more familiar with Bhaskar’s works, I began to engage more with associated works. Future research in the field of environmental education may benefit from further and more direct engagement with the works of Hegel and Marx in order to deepen understanding of the possibilities for further engagement with dialectical critical realism.

Future research might benefit from consideration of Bhaskar’s elaboration on dialectical critical realism through reflections on ‘meta-reality’. This further turn in critical realism has emerged from the deficiency, absence or lack Bhaskar has pinpointed in the discourse and practice of critical realism ... “that insufficient attention is being paid to the spiritual dimension of human life” (Bhaskar, 2002: 21). From a secular and non-secular position it might prove useful to gain deeper understandings of the moral dilemmas highlighted through value-based reflexive deliberations at 3L through reference to Bhaskar’s “spiritual exposition of being” (ibid.: 21). As indicated earlier, this was a neglected area in the Schools and Sustainability Course, which affected explicit engagements with judgemental rationality and ethics-oriented choices.

And finally ...

*It takes a lot of things to change the world:
Anger and tenacity, science and indignation,
The quick initiative, the long reflection,
The cold patience and the infinite perseverance,
The understanding of the particular case and the understanding of the ensemble:
Only the lessons of reality can teach us to transform reality.*
(Bertolt Brecht)

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APPENDICES

- Appendix A: Documents that formed the basis for an historical review of the Schools and Sustainability Course
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APPENDIX A:

DOCUMENTS THAT FORMED THE BASIS FOR AN HISTORICAL REVIEW OF THE SCHOOLS AND SUSTAINABILITY COURSE

Doc No.	Document name	Author(s)	Pub date	Publisher	Further information
1	Active learning through OBE: An interdepartmental support for the piloting of environmental learning in Grades 4-8	Schudel , Dambuza, Lotz-Sisitka, Magonare, O'Donoghue, Solomon	2000	NEEP-GET	This book was developed by the National Environmental Education Programme - General Education and Training (NEEP-GET) to help pilot active learning in the context of Curriculum 2005.
2	Active Learning in OBE: Environmental Learning in SA Schools: Report of the NEEP - GET Pilot Research Programme	Lotz-Sisitka & Raven	2001	DoE	NEEP-This was an evaluation report developed for the GET Pilot Project: August 2000 - February 2001
3	Formative Monitoring and Evaluation Final Report: Storyline of a project in context: NEEP-GET in the Eastern Cape	Raven, Timmermans ¹ Lotz-Sisitka & Nduna	2005	RUEESU	This was part of the monitoring and evaluation of the post-pilot NEEP-GET programme: 2001-2004
4	Formative Monitoring and Evaluation Final Report: Lessons learned: Institutionalising environmental learning in the GET band	NEEP-GET	2005	RUEESU	This was part of the monitoring and evaluation of the post-pilot NEEP-GET programme: 2001-2004
5	Programme for Makana NEEP-GET Cluster	Timmermans	2002	unpublished	This document was a programme of activities developed for the 2-year, 24 credit environmental education course for teachers, run from 2002-2003, by Rhodes University Environmental Education and Sustainability Unit (RUEESU)
6	ZA1260 Makana School Environmental Support Project: Final Report - January 2002 - December 2002	Timmermans	2002	unpublished	This document was a report written for WWF-SA who funded the 2-year, 24 credit environmental education course for teachers, run from 2002-2003, by Rhodes University Environmental Education and Sustainability Unit (RUEESU)
7	ZA1260 Makana School Environmental Support Project: Final Report - January 2003 - December 2003	Timmermans	2003	unpublished	This document was a report written for WWF-SA who funded the 2-year, 24 credit environmental education course for teachers, run from 2002-2003, by Rhodes University Environmental Education and Sustainability Unit (RUEESU)
8	ZA1260 Makana School Environmental Support Project: Final Report - January 2004 - December 2004	Timmermans	2004	unpublished	This document was a report written for WWF-SA for the 2004 - 12 credit course run by RUEESU for Makana and with WESSA for the Ethekwini Municipality

¹This was the author's previous surname.

9	School & Sustainability: Course Orientation	Schudel, Wigley and Maselana	2004	RUEESU	This document was part of the course materials given to teachers in the 2004 - 12 credit course run by RUEESU for Makana and with WESSA for Ethekwini Municipality
10	Schools & Sustainability 2004: Course Evaluation	Pat Hoffmann	2004	unpublished	This was an evaluation conducted by the Ethekwini course coordinator of the 2004 - 12 credit course run by RUEESU with WESSA for the Ethekwini Municipality
11	Environment & Sustainability in Schools: Course Evaluation	Pat Hoffmann	2005		This was an evaluation conducted by the Ethekwini course co-ordinator of the 2005 - 12 credit course run by RUEESU with WESSA for the Ethekwini Municipality
12	Evaluation of Environment & Sustainability in Schools Short Course, 2006	Pat Hoffmann	2006	unpublished	This was an evaluation conducted by the Ethekwini course co-ordinator of the 2006 - 12 credit course run by RUEESU with WESSA for the Ethekwini Municipality
13	Researching Materials in Use: A case study of the use of DWAF 2020 Vision education materials in the Environment and Sustainability in Schools teacher professional development course	Schudel	2006		This was a research report of the use of Department of Water Affairs and Forestry (DWAF) environmental education learning support materials used in the 2005 course run by RUEESU and WESSA for DWAF
14	Final report on Schools and Sustainability Course	Laura Conde-Aller	2008	WESSA	This evaluation was conducted by the course co-coordinator was for the April 2007 - March 2008 course run by RUEESU and WESSA
15	Environment & Sustainability in Schools: Course Orientation	Schudel, Hoffmann & Wigley	2005	RUEESU	These are course materials given to teachers participating in the 2005 course run by RUEESU and WESSA - Howick in 2005
16	Schools & Sustainability: Course Orientation	Schudel, Hoffmann, Wigley & Conde	2007	RUEESU	These are course materials given to teachers participating in the 2007 courses run by RUEESU and WESSA in Howick and in the Border-Kei region
17	The spiral model: New options for supporting the professional development of implementers of outcomes-based education	Squazzin & du Toit	2000	LfS	This document was a product of the Learning for Sustainability Project (LfS) which was an influential project in environmental education teacher professional development in South Africa: 1997-2000
18	A cluster approach to professional development support for teachers in South Africa: An illustrated proposal	Squazzin & du Toit	2000	LfS	This document was a product of the Learning for Sustainability Project which was an influential project in environmental education teacher professional development in South Africa: 1997-2000
19	Eco-Schools South Africa: Handbook	WESSA and WWF	2009	Eco-Schools - SA	This document was a handbook given to teachers when they enrolled in the Eco-Schools - South Africa programme

APPENDIX B:

TRANSCRIPTION OF REGIONAL WORKSHOP 2 AUDIO RECORDINGS (EXTRACT – 5 out of 39 pages)

Regional Workshop 2: 2008-07

Transcription of sound bytes

05010100.MSV

I: All right. It is very important remembering the central focus of the activity is getting learners to work with information so I need to see what information they worked with. How did they use it? Did they do a comprehension? Did they answer questions? Did they read it and report back? What did they do? OK? So remember that in your file you need to show that information and how they dealt with it. OK. And ideally that information is about providing a background for learners so that they can make an informed choice about some kind of environmental decision. We must remember that environment info is going beyond prior knowledge. OK? So we don't just want to ask what they think and what they feel and what they know and what their parents know – whatever. We need to give them something that is going to teach them and take them beyond. OK? So think about that.

X: Thanks

[clapping]

I: OK. Nandi

Nandi: Morning. We investigated the environment problem in my school with my learners. We discovered that the environmental problem in our school is littering. Then I decided to develop a lesson on that. When I was developing the lesson on littering my learning outcome was NS and my LO was LO1: Scientific investigation. Where the learner will be able to “act confidently and curiously about natural phenomena including investigating relationships, solve problems in technological and environment contexts”. AS is “investigation and collect data, organize to gather and record information”. My first step ... firstly – what I asked is: “What is litter”? And they managed to tell that litter is ‘dirtiness of the area’ or an area is dirty and they mentioned types of litter like paper, plastics, bottles, and so on. Then the first activity was to go and investigate litter – someone will go outside and look for litter that is lying there and she is going to investigate: What is it made of? Where does it come from? How can we reuse it or recycle it? So it is where we are with the learners. They are still collecting that information.

I: So where the litter comes from? Is that part of it? You said they want to investigate where it comes from? What do you mean?

N: They are going to investigate the types of litter like plastic, we take a plastic and we see what is this dirty thing made of? Where does it come from?

I: What do you mean where does it come from?

N: It is made of plastic or it is made of paper or if it is made of tin.

I: So they only looked at what it was made of? Ok. So what environmental information did you give them? Did they work with?

N: They work on pollution

I: So what info did you give them?

N: So far I am just waiting for my learners to bring that information. We are still busy with it. We have not yet done our lesson. Because we are going to discuss. I am going to give the information that you can re-use, you can recycle –the litter.

I: And have you got that information?

N: No, I didn't bring, but I have got it.

I: So you will put in your lesson plan. So about how to re-use and recycle? Will be the information?

Nandi: No, I don't have it. I know I have to have it.

I: Thank you. OK. Nellie – thanks ...

Nellie: From the first day – we called the children, together with the teachers. We went around our school to focus what was the main thing that need to be included. So according from the children's report back they all suggested that we concentrated on water because the main problem in our school is the leakage of burst pipes and in the toilet - the cisterns. After that we came up that we need to have our focus on water management. After that, first of all, I wanted to know from them: How is water formed? After I have heard from them, then I ask them to draw for me. After I have explained to them how is water formed. And they did draw. Here are some of the drawings [shows drawings]. Then from there we called the municipality people - asking them from them: What can we do? In fact before we called them – the SGBs, together with the community we all came together. So we have decided we better go and call the municipality because it is also those from the school. So immediately the municipality came. What they find – that where the water, the stoppage, the clock which goes around so the – that is too old and it needs to be taken out. That is why sometimes the water does not come out. So they put – they fitted a new one. So immediately at least now the problem of the water coming in drips and that sometimes we don't have water – was solved. We now needed a new lesson, since our water is no longer now doing what it was doing. We have got to know

now ... how we can conserve water. So it came from them that first of all, while they are washing their hands from the toilet or want to drink water, they must use a basin. So for their activity they showed it by doing drawings and cutting too and from that ...

I: Did you give them information? Or did it come from their heads.

N: It came from them. It came from them because first of all I wanted to get from them the information then after all children has participated, now I started now giving them the information.

I: OK

N: Of how we must care for our water and when they go to the loo, they must not just play in the toilets, by flushing every now and then and it was also that they even catch teachers of that. And I didn't even tell that it was a lesson for Grade 2s.

I: Thanks Nellie.

N: And they must also tell now - use - instead of using a shower they must also use a ... tubs ... or baths for washing. Because it also saves water.

I: that is ..what kind of tub? A big bath or a small tub?

N: It depends ... This tub.

I: Because I have always heard the opposite. That a shower uses less water than the bath. It depends of course on how long you stand under the shower, but a bath , if it is this kind of bath [demonstrates] then it uses a lot of water.

N: Unfortunately in our area we don't have showers. We use a bath

I: But it is not a ... it is a basin. More like a basin? OK. Ya.

N: And then ... also too you must not dirty our water. Like by taking ..eh. .. cows to the rivers where people are supposed to drink. In any case how is water made? They - by taking big loads of washing to the river where people are washing and even by pouring dirty things in the water ... or – and also litter by the riverside. And all this – they are also - they are Grade 2s they are all shows this information with their papers. And after the lesson, it is also combined with Language. Because ... eh ... in environment. You can also use ... eh... your Language by reading local newspaper, talking to the community and inviting also special people who knows and elderly people. And I also even used the book which is a handout – water is life ... also by Alison Kelly - and this is a handout for teachers.

I: OK. Thanks Nellie. That is great. I think something you must be careful of ..um ..the one is – in the learners minds to help them to separate out two issues, because you have dealt with two big issues here. And I think it is quite important to have it in 2 separate lesson plans. The one is water use and water conservation. And the other is water pollution and how to look after water. In the learners' mind, that must be a clear distinction – water quantity and water quality. Two separate lesson plans, separate

projects in the school – OK. So don't let it all roll into one – anything we know about water. Particularly if you are trying to address a problem. If you start by saying your problem is leaking pipes and cisterns – OK? Um ... but I think ... I am not quite sure and then you ended up with water quality and washing in the river. But just remember to keep in their minds a clear picture about what you are trying to do, what you are trying to improve and then – a nice little compact focused lesson plan around that. All right? So maybe keep the water quality for another time and stick with the water quantity for now. Finish that off, neat package, Move on.

N: Mmm

I: And I just wanted to ask. You said your problem was leaking taps, but then it sounded like your problem was actually dripping – did I misunderstand you? Did you say dripping taps or leaking taps?

N: They are leaking because most of them. No one does ...

I: Turn them off?

N: Mm.

I: So did you address that in your lesson plan? Because you spoke about ways of conserving water. Did you address the particular problems in the school or did you look at baths and showers? Or did you also look at the school?

N: We did – it was in the project – is still on, because those people they find the first thing they must do. They must stop the leakage by putting in that stopper. But now they say that some of the pipes still are not right. And still have to install new things for the sanitation to.

I: OK. SO is the problem that the municipality has to do or are there some things you can do to stop the water waste in your school? Something the learners can do?

N: What we are doing with the running water. We have opened furrows to take the water towards the garden

I: But there is nothing small like changing washers or fixing a cistern that the school can do?

N: Eh ...the Department of Ed has sent us some new cisterns but they have not been fitted yet.

I: So the cistern is not repairable, it has to be replaced. So it is quite a big problem. OK. But just try keep – as I say – keep your lesson compact, keep it around a particular focus and you can talk about that with your tutors about how to do that. OK? Thanks Nellie
[clapping]

I: Another Nellie

Nellie 2: Good morning everybody. I have a problem because my colleague has not yet arrived so I am going to summarise it.

I: That is perfect.

N2: My lesson plan is 'our environment' at school, particularly – the school environment – littering. So I took a healthy environment and so I did with the learners some activities. The first one there – I asked them to collect the waste from their homes things like – uh ... bottles and cartons of eggs... and that and so on. So we sorted out the different kinds of waste according to the categories and the ... eh ... I gave them the information that there is waste that are also important because you can do a recycling to deal with waste. So I gave them that knowledge. And ... eh ... we also do ... um ... activities ... first of all starting with the glass the importance of picking up anything on the floor – not to throw down. So after that we go out to the school grounds and collect the waste. The school got some resources such as dustbins and black bags. So that each class must make sure that each class has its own ... eh ... bags for waste. Then after that we also drew some ... next to the garden ... we also drew some compost ... drew a compost next to the garden. Then we encourage all the learners in the school to use that compost and ... eh ...

I: And did you link that across to the idea of recycling?

N: Yes.

I: OK. Recycling of organic materials?

N: Yes. And also gave the information that if even in their homes it they must collect waste and use it in the garden. The peels of the vegetables and some other things.

I: Ok. So in your lesson plan have you got clear evidence of the information you have given them, like pictures or worksheets or just notes about what you told them?

N: The tool that we used is to draw because they are Grade 1

I: But have you got evidence of what you gave them. Because we don't just want their prior knowledge. We want new knowledge - have you got evidence of that in your lesson plan?

N: Yes

N: What evidence?

N: The evidence is the differentiation of the waste

I: You gave them information on that? In a worksheet or what?

N: In a worksheet. I did the drawing in the worksheet.

I: That is lovely

I: All right. Thank you.

[clapping]

I: So everybody – I am loving hearing these stories but I am worried we will spend a whole day if we give everyone this amount of time and I am also worried about losing others attention. So when we break into groups to report ... um ... and maybe we can break up into three groups and I can lead a group, Laura a group, Chay can you lead a group? And then the tutors ... shall we make more groups or should we have the tutors join? OK. Even smaller

L: Three big groups – us and tutors as well [more discussion on logistics].

I: OK one group on waste [discussion on who to join], 2 people, the other on nutrition – we have 9. Other themes – other besides Nellie? Other themes? Only Nutrition or littering? OK. [logistical discussion]

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Breakaway groups giving feedback on LU1

Laura: Would you like to share with us?

Teacher: I am not going to start with the scoping with the learners where there are also many stones around as a new site in our school. We are 8 months there. So I started – I used resource – the one – organic classroom – I didn't do a copy for this. Making sure because there are so many stones around. There were some big stones that cannot be turned out by the learners. So I asked from the learners that if there is the stones, how can we change this environment to be healthier? They said if there will be a garden – it should be garden and flowers. It should be a healthier environment. So I asked from the principal a tractor to remove that – we started. And the learners were preparing the soil. Yes. So ...

L: So you started from the action?

T: Started from the actual then go back to the classroom. I am teaching grade 1 and 2, so the young ones like to listen from you. So, to make it real now in curriculum, I started ... I told them a story about ... eh ... a hungry child who was 8 years old and who didn't attend school properly because there was no food at home and also the community didn't help them because next door there was a family with a food garden. There. So I think the neighbours thought that even those people can do this, can make garden, but it was a problem to the learners. So I told the story and it was interesting to them. And I asked to them the questions, but they were not helped by the community. Maybe why? And also even this was – was the parent correct to leave the child at home whilst he was so young – 8 years old. That is – I was touching the principles – there – that the mother was violating the rights of the child because that 8 year old child should be at school not at home at that time.

L: What was the purpose of your story

Teacher: Purpose of the story was starting the garden

L: Story so the children will start relating to their context and maybe relate to nutrition and food gardens.

T: It was related to the context. My context was nutritious food.

L: Ya. Situated story

T: Yes

L: Then – from there. Where did you go?

T: From there ... um ..from the questions now we went to the vegetable ... to the food they brought to school and the food they get from school. That is bread and milkshake and those in their lunchboxes. And from there we chose then – we categorised them now from those they had in their lunchboxes – that is fruit and vegetables. Where I discovered that they don't understand – they don't sort rightly – the difference between.

APPENDIX C:

NOTES FROM DISTRICT WORKSHOP

Venue: King Williams Town

Date: 2008-06-24

Facilitator: Nombeko

Attended by: Nombeko, Gloria, Nondwe, Nozuko, Nokwanele, Nwabisa, Nomhle, Mandisa, myself

Re-written from rough notes: Research Journal 1: pg. s 6-16

General:

The workshop was about teachers feeding back on their progress with LU1. They had not completed all activities. All had started with designing their lesson plans and only Nomhle had done any implementation. Towards the end of the workshop Nombeko pressured them to implement before the next LU which would have only given them a few days for implementation. I realised that with all the suggested changes we had made during their feedback, to have pushed them to implement would have compromised on quality. Hence I suggested that we only ask them for complete lesson plans and for them to implement at the beginning of the next term. Nombeko was clearly pleased with this decision although I appreciated her 'no-nonsense' manner with the teachers – pushing for them to meet deadlines. I emphasised the importance of deadlines, but said for this time we would be lenient.

In general I was struck by the teachers' respect for Nombeko and valued having a DoE person supporting the programme. Nombeko was firm but friendly with those that arrived late. One teacher said to me while Nombeko was out of the room that she was afraid of Nombeko because she had left a form behind that she was supposed to fill in!

Regarding the evaluation: I introduced the consent letters I had drafted and asked teachers to think about whether they would like to help with the evaluation. I stressed that it was entirely voluntary and also that even though the process was an EVALUATION as well as a research proves, there was no intention to make a value judgement on them or their schools, but rather to highlight the challenges and influences in their work.

It is noteworthy that these teachers are working concurrently with Nombeko on their Eco-Schools status – thus there is evidence of Eco-School contributions in their feedback discussion.

I was struck also by the commitment of the teachers to come to these workshops as many came from significant distances away. Particularly one teacher (check, but I think this

was Nokwanele) who lives in PA and commutes every day to Pedi where she teaches. This teacher had traveled to King to the workshop and then caught a lift to G'town with me where she was going to catch a taxi to PA ...

At the end Nombeko thanked me profusely for attending and said it had helped a lot having someone else to work with the teachers so that we could give them more individual attention. I concur that the workshop was particularly fruitful as many of the lesson plans were quite thin without clear environmental foci and I believe we made significant progress in deepening the env. focus...

Teachers who volunteered to be part of the evaluation ...

Nomhle Stota Nondwe Murial Belu

Nozuko

Mandisa

Vignettes: Progress of each teacher (drawn up from report backs to the group as well as individual meetings that I had with Gloria, Nokwanele, Nozuko and Nondwe)

• **Gloria**

<i>General/Context:</i> Sesebenzo school Have chosen members of Eco-Committee Write Eco-code and 'way forward' for garden. They selected portfolios Started their veggie garden by burning grass - they intend to clean and then plant veggies. Nutrition is their focus area.	<i>Lesson plan</i> Her concern: Sellers outside the school selling junk food to the learners ... She is working in Grade 4, NS Her lesson plan originally consisted simply of their prior knowledge about healthy and unhealthy, and an activity where they collected pictures from magazines to make posters categorising healthy and unhealthy. She had used LO1?: AS1 which requires learners to PLAN an investigation. I steered the lesson plan differently according to the following concerns: * There was no planning of an investigation – I advised that LO2 (about constructing knowledge was more appropriate) * There was no NEW information * The first principle could have been brought in more strongly (i.e. the dilemma of conflicting with sellers who make a living out of selling junk food to learners) * For learners to simply list healthy and unhealthy food would be too simplistic for Grade 4s We ended with the following proposal for the lesson plan: * Gloria will interview and write a story about the sellers (to bring in socio-economic issues) * She will go to the library and research information that will help learners understand WHY junk food is unhealthy (going BEYOND prior knowledge) * Learners would make posters using food wrappers etc from the sellers and make posters about these foods giving reasons why they are healthy/unhealthy ...

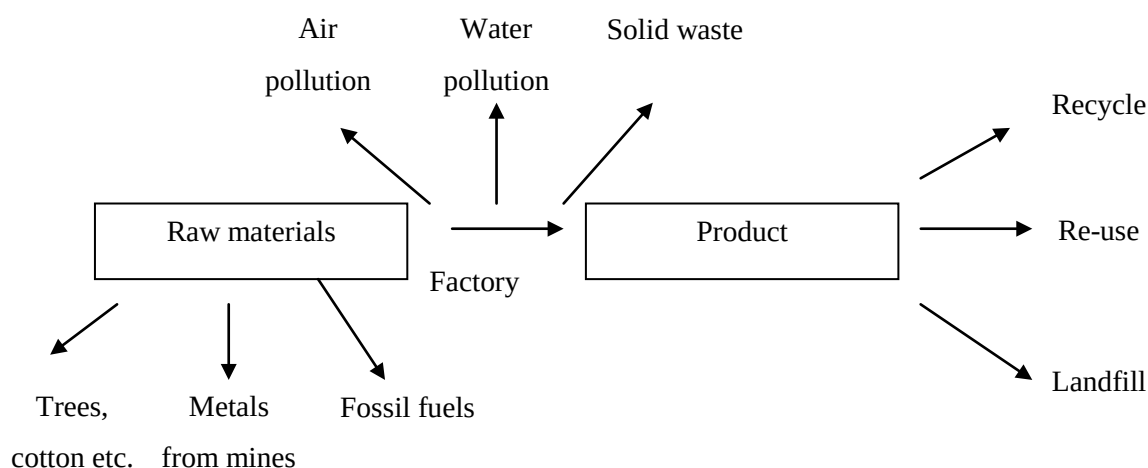
- **Nondwe**

<i>General/Context:</i> School: Qaukeni She introduced Eco-Schools last year to parents and SGBs and they were not keen. This year they have still not wanted to register as Eco-Schools. They have been a 4H school in the past, but have withdrawn. Nondwe implied that they do not have enough support – e.g. on 10 June an agriculture official offered to visit their school but they have not yet heard from that person. Their principal gave them R200 to pay someone with a tractor to plough their field They are working on the veggie garden with 5 women from the community (she commented that males do not attend meetings). The women will care for the garden by clearing it and watering it during the school holidays. Nondwe explained that she is a foundation phase teacher but that she had been asked to teach intermediate phase at school because they were short of staff in this phase. [this perhaps explains her struggle with finding the right level for the lesson she was busy with]	<i>Lesson plan</i> Chosen LOs were a language LO1, 2,3 and 4. Activities focused around learners naming tools and writing sentences about these. I pointed out the following problems: * Writing simple sentences was not challenging enough for Grade 4s. We confirmed this by checking in the NCS where learners were asked to write ‘paragraphs with simple and compound sentences’. * There was no new knowledge (the whole purpose of the activity) We were running out of time and I struggled to find out what would be appropriate for her to do. We ended up suggesting that she does an activity on compost: * They get an expert to tell learners how to make compost and getting them to report what they heard in the form of a diagram (addressing the Language skill of listening and reporting in diagram form) * She finds/compiles an information sheet about how to make compost . * ... all activities not recorded BUT I noted: WE had not addressed the 1st principle. I was not sure how we COULD have and if we SHOULD have???

- **Nozuko**

<i>General/context:</i> BambananiSchool They have a committee Parents have shown a big interest in EE. Her classroom has become a store room for waste (especially paper), but as far as she knows, there are no recycling initiatives in town. Her intention is not to collect a big amount of waste and re-use in craft projects rather than in recycling projects. She has 89 learners in a classroom as their school was vandalised and they are short of classrooms. They are in the process of having a fence installed to address this problem. There are two teachers teaching these 89 Grade 3s in one classroom. They are sitting 3 to a desk. They have an Eco-code which links to the school mission in its focus on cleanliness in school, bodies and homes In choosing the topic (through the picture scope), the learners showed an interest in sanitation as the focus. She, however felt that sanitation was too much a municipal problem (they currently have 4 pit toilets for 500-600 learners) and pushed for waste as the issue to be addressed as the dirty	<i>Lesson plan</i> Nozuko wanted to use Life Orientation LO1: AS2, Grade three that requires that the learner “Participates in a recycling project, and explains how recycling contributes to environmental health”. She was not clear on how she would meet the second part of the AS (the explanation). We looked at Nicky’s Share-Net waste pack with a paper life cycle and found that a generic understanding of resources-to-product would be more useful than trying to get Grade 3s to understand a complicated life cycle for each material they might recycle. Thus I helped her with the diagram visible below. In retrospect I think I misled her by stating that her ‘making useful things out of waste’ idea was not recycling but re-use. This definition argues against my point: “Reusing materials and objects in original or changed forms rather than discarding them as wastes”. www.nsc.org/ehc/glossar2.htm But I highlighted for her that whatever we called it (re-use or recycling) it was important that the diagram would help learners to take a critical look at how their activities might/ or might not contribute to env. health ...

school was a concern of hers. She has stated that she would like to tackle the sanitation issue at a later stage ... They participated in World Env Day. Their school won a competition for drawing 'what does the environment mean to me'.	



- **Nokwanele**

<i>General/context</i> School – Tatshana She is struggling to get a commitment from the principal to join EcoSchools. Even though the SGB is supportive of the initiative, they have not yet had a committee meeting. Her school is involved in 4H and I asked if that was the reason (that it has too many programmes on the go ..). She said it may be, but was also concerned that they are not even fully committed to 4H. I noted that she can probably manage S&S on her own, but ideally she does need the whole school for EcoSchools. I suggested that 4H and EcoSchools complement each other and that they strengthen both 4H and EcoSchools by combining the two committees and that there becomes an environmental representative (herself) on the 4H committee. The interest of the learners is in flowers rather than veggies (which was her preferred interest). There are some aloes in the school which learners want to clear (Nondwe commented that this would be appropriate in a 4H programme). She would like learners to have their own flower plots to look after in groups...	<i>Lesson plan</i> She had planned a language lesson – introducing the sound ‘hl’ with learners. She used garden tools with this sound so as to integrate gardening into languages ... I asked how this could be broadened to include the 1st principle ... We came up with the following: * she brings posters around malnutrition in children and learners are encouraged to talk about them * As they talk appropriate words and sentences are drawn on the board so as to expand vocab of learners. * The learners then use these words to write their own stories about their own experiences with nutrition (this expands vocab and encourages writing and spelling practice).

- **Nwabisa**

Mbanyaza School – Pedi All schools are busy with 4H in her area except in her cluster. She has introduced Eco-Schools and S&S to stakeholders – they are interested. In the area there has been an irrigation scheme in the past, so because the locals ‘know agriculture’ Nwabisa wants to link nutrition as her school focus to this and do a food gardening project. She wants to integrate with poultry and agricultural projects near the school. She is also interested in wild veggies in her area. They have included an env. focus in their school mission.	<i>Lesson plan</i> So far: They have made posters of healthy and unhealthy food and have done an activity called ‘food fun’ where they categorized healthy and unhealthy foods. Then they had to draw what they would eat for breakfast ... We need to ask the question whether this is sufficient to ground environmental learning aimed at bettering the lives of people and environment... Would a focus on the 1st principle emphasise an env. focus? Would a problem-solving approach make it more meaningful?

- **Nomhle Stoto**

<i>General/context</i> Eco-Schools was introduced at a parents meeting. Parents were reluctant to volunteer to be on the committee, but they were nominated. They are all females. An Eco-code has been included in the school policy. The principal was at first reluctant to include foundation phase learners. But the school has now bought small gardening tools and small watering cans to include the little ones. Learners are now in groups working on plots under the supervision of a parent and/or? a teacher. The principal gave money for a tap to water the garden, and for a tractor to plough the land. The school also bought seedlings (they were hoping to get through 4H, but this did not materialise). The seedlings were planted with assistance from parents and unemployed people who were given R5 “to buy tobacco”. When learners were asked to draw things they did not like (picturescope activity) they drew netball poles *which they said were skew and which they did not use). Therefore Nomhle developed a nice area with tyres? For them to play in.	<i>Lesson plan</i> Nomhle discovered that they did not know the difference between fruit and vegetables. She bought magazines for R1 each (from the library??) knowing that they had what she needed (did they make posters with these??) Learners were asked to pick up sounds in different fruit and veggies. In maths they did multiplication: “How many cabbages in a row? How many rows?” After a group discussion on the first principal (asked by Mandisa) Nomhle wrote a story during the workshop (encouraged by Nombeko) for introducing the topic which brought in socio-economic issues around nutrition ... This was in response to my comment that although she had told a story to the learners it would be nice to be able to SEE this in the portfolio as I had the impression that it was done too informally if it was to make an impact ...

- **Mandisa**

<i>General/Context:</i> Focus: Nutrition	<i>Lesson plan</i> Started with info on fruit and veg – how to eat well and what to eat. Mandisa commented that her lesson plan does not currently encompass the 1st principal ... and asked how she could bring it in and how she could find appropriate LOs and ASs. We realised that she needs resources to tell the

	story. For example, stories, poems etc ... I suggested that she looks at the Children's Charter and that she writes her own story about children who do not have food, nutrition, for what reason etc. Nombeko highlighted how important it is that if you tell a story that it imparts appropriate information. She also gave an example of bringing in gender issues by suggesting that in the story a girl asks a neighbour for food and the neighbour replies that she cannot give her food because she is a girl.

APPENDIX D:

TRANSCRIPT OF INTERVIEW WITH NOMBEKO

Interview – Nombeko – KWT District Curriculum Advisor

24 February 2008

I: Nombeko – you were telling me about a problem ...

N: I was just saying Ingrid – Many a times I have seen the teachers doing well in handling their lesson, in their classes, but when they have to reduce it to writing their presentations are not directly to the point. They are not good in that. And then when we discuss these things it is like – I always think they are going to write it well. And they even take some notes and things and when they write it they don't drive the point home most of the time. It is just that they are trying to come and come but they seldom get to the point. There is something about writing and presentation that needs to be attended.

I: Do you think it is perhaps a language issue?

N: It is a language issue

I: Not having the words to express maybe – I don't know? Or ... is it a conceptual issue? Have you any idea?

N: Maybe a mixture thereof – I want to think it is a language issue because – I am not sure – because – because – when they teach they do - I assume that they can teach well. But then when they have to write it down, they don't represent it well. Eh. I am mindful of the grammatical mistakes that they make, but even their presenting and writing their activities well – activity 1, activity 2, activity 3. They don't finally master that very well.

I: It is structuring the ...

N: Structuring the lessons. And you sometimes wonder if they don't mix the activities up when they teach in class because they have to have an exclusive activity for assessment and it must be distinct. And yet they – when they have to write it down, sometimes you look for it – you look for it and you don't find it ... well written out – um

I: Have you got any suggestions as to how we can help with that particular problem?

N: I was just thinking I must continue helping them in designing lesson plans.

I: And the template that we give – you know sometimes I worry that the template is too detailed? Um ... or you know maybe the template is inappropriate. Or ... is there anything we could do to the template?

N: The template is fine. It is a little bit more detailed than the departmental one, but it helps the teacher to know exactly what she has to do in the class without fumbling. – eh ... And for ... since they are still learning it is fine – it is fine – because it is until they are sure that they can maybe make a briefer you know – template. Eh. It is fine.

I: What is your experience in the classrooms? With – um – how the teachers run their lessons? Do they – um – do they usually work from a structure? An informal structure? Do they work from a lesson plan? Do they work from a textbook?

N: They work from lesson plans.

I: And do you see them referring to the LPs?

N: They follow the LPs – eh. But then whether the LP is well structured or not is a different story (laughs)

I: But you still find that the classroom activity seems to make sense.

N: They are expected to make lesson plans which are taken directly from the work schedule.

I: Having gone through the portfolios – is there anything else – particularly around the expectations of the course that you noticed they struggle with. Particularly because you are a curriculum person. How are they doing with their curriculum ...

N: I think one also still has to support them in a recording of assessment – ratings – eh ... how to rate continuously you know and taking care of both informal and formal assessment – eh ... I think they still need support there. I have to support them in LP and then assessment. Very seriously on assessment. And using the tools – and also some of them have indicated that they have used the rubric, but you don't see the rubric. Um ... In the design of assessment tools, they need assistance. And how to implement those in class also.

I: You offered on generally. Is it the same – do you think the S&S teachers ... is there any difference between the guidance from the course and – anything that is helping them?

N: It is helping them, because they were not like this when we got them and it gradually improved and I could see from Nozuko's lesson plan, she has improved. I have even written down that she has improved.

I: In what way?

N: Even thinking of ... you know their teaching was just mingled – they did not differentiate from the different activities. And another thing – even at the planning stage – they would choose AS and teach something different. And not base their teaching on the AS. So it is after the practice that they have come to learn that they look at the AS and if the AS does not have content then they bring in content. Um ... So it has made a lot of difference. From my side I think they would say so also because there are some of them they couldn't make good LPs because of that – if you don't base it on your AS then ... it's not ...

And even also linking assessment with the activities and ASs was also another story. Because they didn't they didn't understand what to use for what activity – you see – eh. And they didn't know that what they have to assess is the achievement of the AS itself –

eh ... and then maybe break it down in the activity and see what was of importance in that activity and assess it.

I: Can I ask you as well – um ... you know like some of the strong – the legs of this course – of S&S – the one thing is the curriculum links, which we have worked through nicely with the DoE and I am also feeling positive that we have made a lot of difference. The other questions is about the on the ground activities and the environmental – um ... initiative in terms of making a difference in people's lives – you know improving their lives from an environmental perspective. From the visits you have made ... from what you have seen in the portfolios... , how successful would you gauge that to have been??

N: I am ... the links with the communities perhaps and sustainability of the projects and the programme?

I: have the projects made a difference?

N: They have made a difference in some schools – um – Mvemve's school the community was brought in and then in Wartberg and also at Sosebenza. I am not very sure about Nozuko, whether she finally called the parents in and shared the project – I am not very sure. But I know because I have seen parents in the schools. In these schools. Especially at Sosebenza I have met parents in the garden and assisting. Even when I was there when the parents were a well of knowledge to the children as far as indigenous plants are concerned and they are keeping the garden. I think it has made a difference because after all they need the parents to be part of the learning situations in the school. And also to be able to sustain the food gardens, they need the parents during holidays. If the parents come to school and tend the gardens, then it makes all the difference and then they can find them in good order when they come back and they can continue using them as educational resources. I think it has made some difference especially where the food gardens are concerned, it has made a difference. I am not sure about this waste management project. I think Nozuko - they have to refine – she is saying something that she should have had something to show – something finished – her own finished – a card that was made from recycled paper. I think she has written something like that if I have got it well. The paper they – they made the papers. Just papers – they were not made into a particular product. Like saying we are going to have a card and we will send a message – a greeting card or whatever. I think that next time they need to know what the card will be used for and then they can start you know {looking at portfolio}. Maybe for a start it is good that they have seen that they can make paper and then they must make paper that is useful so that they can say – “we have done a card – we have done this” You see? Maybe for a start that was fine. That is what I am thinking. Because she writes something that they could sell them for profit, but there must be something – not just pieces of paper like that ... no ...

I: Maybe just a very broad question. What do you think are some of the successes and the challenges of the S&S course as a whole?

N: The advantages?

I: Ya, the successes ... advantages ...

N: The success is that they have made different teachers and most of them have enrolled – is it?

I: We have got two of them – one on in the Masters course and one in the ACE course

N: Who is in the ACE?

I: It is Nwabisa

N: I wonder what happened to Stoto.

I: She phoned me and she was too late and she had already missed the first session.

N: [discussion about what she sent etc. ... and how Stoto had missed the application process].

I was just thinking that because some of them have wanted to further their education in the environmental field is an indication that it has impacted on their lives. And I have ..they have made some difference in their school – and the school environment. And in working together with the communities and in changing the childrens' lives, because they have learned something about the gardens and we hope that they are going to use that information and establish gardens in their homes – influence the parents in their homes. Because when they see that they can eat something from the garden – and you know it is something they look forward to that they must find time to go and water the gardens and it is a lovely activity. I saw from the little children at Wartberg, they were enjoying it.

I: Challenges?

N: the disadvantages ...

I; Or the challenges? Where have they struggled.

N: It is not very east to rope parents in. That must have been challenging because they must make sense of what it is and join in and show interest. So it is a weak – it is not altogether. It has not come to the stage exactly when - the ultimate stage where we want to be because they think they come for the garden only and we want them to be involved and ... so that it can be some kind of whole school development. So that they are not only looking to the garden – all affairs of the school, they must take part. I think we are getting there. Although it is a challenge. We will get – we will have to overcome some hurdles before they come to the you know – the ideal stage – eh ... and other challenges were ... Laura supplied us with seeds. So I wouldn't say there was a challenge of acquisition of material – especially – but then with – maybe with Nozuko – I don't know because it was waste, but she got late the frame – ne? And who else? Mvemve – is a school garden – and ...

I: So they have managed with resources?

N: They have had resources. They got trees. They got trees for their schools and then they got the seeds. Eh ...

I: What about – um – TLSMS? Have they been sufficiently supported?

N: That is a problem? That area is a problem because even when they have to choose other focus areas, we will need to supply materials. Sometimes I have to photocopy for them, but I am – it is not as – it is not enough. It is not enough. They need support materials for them to understand the content of their areas. I think that is a challenge – em ...

I: OK. And then I wanted to ask you about – it seems to me that you feel that community links are very important for projects. You have given reasons like the garden needs to be watered. Um ... do you think they are essential. Can a school manage small or alternative projects without the community. Or – how central is the community in making environmental projects happen?

N: Maybe there would be some projects but I was thinking of the garden for instance – when the schools close they need the parents to be part of – especially where there is no caretaker. Eh ... and then with some projects like for instance in Nozuko's case, this project can be done without parents really. It depends on the project. Eh ...

I: OK.

N: But we would love to sustain it. We would love to rope in parents because some parents could take it on a bigger scale even though – especially those that can be made for profit purposes. They can even change the community. And then it would be – it is easy to especially in the rural areas, where parents need something to come together and do – I remember in Queenstown there was something like family maths and then we use dot have – to call in the parents and then we teach those – eh ... engage the learners in activities together with their parents and it was so nice because some parents discovered some things they didn't know about their children. That they could count and others could not count and they determined to assist them and from those encounters they thought about the project they could start and I remember a project that was started –they made sandals from rubber things and they sold – and it was successful. So when they come together like this there are so many things they can think about improving the school and some things that could help them as people so that they have something to look forward to - to change their lives. Eh ...

I: Fantastic. Thanks Nombeko

APPENDIX E:

MANDISA PORTFOLIO EXTRACTS

LU1

Pg. 11 - Mandisa saw the following possibilities in the curriculum for environmental learning:

Life Orientation: LO1: Health Promotion: AS1: "Identify nutritious choices from a range of commonly available foods and drinks".

Pg. 11 - Mandisa considered activities such as "field trip to discover indigenous vegetables, record these, use knowledge gained to make menus and give reports".

Pg. 12 - She also saw the possibility of linking to the nutritious food theme through a garden producing "cabbage, spinach, lettuce, onion, potato and various fruit trees".

Pg 12 - "SS: In the social science the main thing is the development of investigation skill. The children will be able to demonstrate historical knowledge and understanding e.g. what elders used to eat, how many times perday, where did they get their food?

"EMS: Helps to protect natural resources e.g. indigenous plants *imifino* and fruit. In my school focus area is nutritious food which will be produced from the school garden. Sustainable growth of food garden will assist every child, teacher, parent"

Pg. 15 - "Almost all learners were concerned about the same environmental issues:

- * Cleanliness of the school
- * more planting of trees and flowers
- * fixing of electric cable
- * fixing of drizzling taps
- * cutting of grass
- * playground area"

Pg. 20 - Mandisa identified prior knowledge of learners about nutrition as "they know in order to be healthy they must eat different vegetables, fruits, start to grow vegetable". She said that new knowledge needed was: "types of seasons for planting, fertilisers to use in the garden"

Pg. 32 - "Learners like to eat sweets, cakes, chips, ice cream. They believe when they eat such food they are full. Fruit and vegetable are not part of their daily eating. Water and milk are less important to them"

Pg. 32 - Knowledge gained was: "to identify healthy food and drinks. Distinguish between healthy and unhealthy drinks. Some food can be eaten raw. To learn why some food are more healthy than other. To distinguish fruit from vegetables, water, drinks, sweets, dairy etc"

Pg. 37 - Reflections: "The school is in the process of improving because all learners are made aware of their environment. How to take care of it, addition that can be made to improve condition such as planting of flowers to beautify the school, then need for the cleaning of the school by collecting papers for re-use (sometimes). Checking that taps are not left unattended. We have already started a vegetable garden. Every afternoon some of the children are helping by working whether hoeing or planting seedlings"

Pg. 39 - Reflections: "I wonder whether learners will practice to buy healthy food or help their parents when doing groceries or making food - breakfast, lunch, supper"

LU2

Enquiry issue:

Pg. 5, LU2. Mandisa, in answer to a question where she had to search for LOs and ASs linked to hands-on enquiries, chose Life Orientation LO1 - making informed decisions. She linked that to the garden activity saying "Learners are hands-on in the school garden by watering, planting, taking care of tools used. In their homes they also encourage their learners to do the same"

Pg. 5 - in reviewing the curriculum looked for LOs relevant to enquiry. She found SS LO3; "Exploring issues - the learners will be able to make informed decisions about social and environmental issues and problems". She referred to AS2 which reads: "Identifies and describes issues affecting personal health or safety in the school and/or home environment [the issue]". Mandisa said in relation to this that "Learners were hands-on when our school yard was damaged by a truck. They made garden was safe from animals during the day. All the waste material will be collected and put to the other side. Beforehand the school starts they will arrive early to water the garden also the mulching was done by them after they collected grass that was cut"

Pg. 5 - In answer to a question where she had to search for LOs and ASs linked to hands-on enquiries, she related Maths: Space and shape (geometry), to : "our plots are designed in the form of shapes" pg. 5

Pg 30 - reflections on lesson plan "learners managed to do activities with enthusiasm, curiosity and flexibility. Go out and interview parents on their own. Write down food their parents ate. Compare/sort data - olden day vs now"

Pg 30 - "Our school has improved drastically. We have a school garden, we planted trees, shrubs, flowers, herbs. Grade 1 learners are conscious of what they eat - less sweets, more fruit and vegetables. From information gathered from their investigation they asked if they can plant *imifino*, herbs, sweet potato, *intyabontyi*. They want their own plots to be created in the form of shapes. Their parents are more involved than ever in their children's interest (Managed to come when invited)".

Pg 30 - Reflection on methods used: "I regard each learner as unique as an individual whose experience background and interests should be taken into consideration. I'm also sensitive to language used in my classroom (HL is used). I also arranged and organise my classroom in order that all children feel welcome this create their active participation. Learners learn well when they feel safe and know what is expected from them. Give clear instruction as well as support (not yet ready to write some of the words). Learning process was learner centred, actively participated".

Pg 31- "By this time our garden was viable. All the seedling were growing gradually and learners could see the results. Drawing, writing, counting, investigation, encouraging learners to research food that was available, used for, e.g investigating sustainable indigenous technologies. Working with parents stakeholders is crucial whilst one is presenting the lesson in the classroom other parents are hoeing in the garden"

LU3

Pg. 28 "The learner has shown the knowledge of identifying nutritious food from various food choices. She also showed the ability of recognising and responding to environmental problems by eating healthy and keen to be part of growing vegetables in the garden"

Pg. 28 - "The learner still needs to link knowledge to her everyday life assisting at home to make informed decisions when buying groceries, during break to buy less sweets"

Pg. 28 - "The learner used language to think and reason. She is also able to give explanation, ask question when not sure"

Pg. 40 - In response to the learners' work "Planning and tackling my task" Mandisa reflected that "It enabled her to plan step by step what she is going to do. It also expanded learners understanding about the importance of collecting preparation of soil, planting, labelling, also the choice of healthy food from various including indigenous" "She has developed the skills of writing down her planning and carrying out the task on her own. She also managed to investigate and explore various ways of getting food e.g. *imifino*, where it comes from"

Pg. 41 - "Learners were able to identify nutritious foods on their own. Big poster enabled learners to differentiate clearly. Collection of indigenous plants, planting, labelling, caring, cutting, pasting, colouring, ensured learning. Knowledge and seeing various vegetables growing from seeds to plants motivated learners"

Pg. 41 - There was a shortage and non-availability of books. I did a lot of photocopying. I would like to take learners to large fields to deepen their understanding when it comes to plants such as mealies, beans, peas etc"

Pg. 41 - "I would like to take more photos of evidence of what we do orally. When we discussed the importance of growing, planting, harvesting etc. Most of the time we work in groups because of scarcity of worksheets making it difficult sometimes to assess each learners' performance"

Pg. 41-Mandisa's reflection of active learning:

"Prior knowledge: Knowledge of eating healthy nutritious foods where one gets this food. What to do if one does not have money to buy food.

"They also learn how to find information, conduct local enquiry when they interviewed their parents about various kinds of foods. Example is the information they have of nutritious dishes such as *imifino* that is not bought. So poverty, unemployment, working together, sustain and preserve. What they have already embarked on (planting of garden, replanting of *imifino*). As a teacher I encouraged learners to tell their parents about the importance of eating healthy, make informed decision when buying food if need be brown bread v white bread, milk vs fizzy drink, drink a lot of water, exercising by working in the garden"

Pg. 54 -Mandisa mentioned that they were able to sell vegetables from their garden and to cook for children - "vegetable soup on Tuesdays and Thursdays instead of butter".

Pg. 54 - "Challenges: Some parents who assist in the garden expect to have veggies everytime they work in the garden or to be paid"

Pg. 54 - "I have many children in my school who are now advocates of healthy eating, growing vegetables, sustaining our garden by taking care of it. The surrounding schools have come and ask how did we manage to have a school garden. Some are observing what we do after school. Three gardens have been started in our community inspired by us"

Pg. 54 - "Parents were willing to teach children about their food especially the cooking and menus" pg. 54

Pg. 54 - "All my learners are keen about what they know. they teach others ... comments such as "Do not eat too much sweets, drink lots of water" are order of the day.

Pg. 54 - "Every child in my school is in the sustainability mood. They make sure their school is neat and well kept. All gates are closed during and after school so that animals may not enter. Taps are closed. Water is not misused. Each morning they fill their basins with water put in front of each classroom for washing hands"

Pg. 54 - "I fear sometimes that environmental education is not going to progress from one to another grade (1 to 2). What is going to happen to my children in grade 2 if the next teacher is not inspired by the work already done"?

APPENDIX F:

LESSON PLAN ACTIVITY DESCRIPTION WITH CURRICULUM LINKS

(CODE: LP3NS)

Environmental focus of LP: Investigation of food eaten

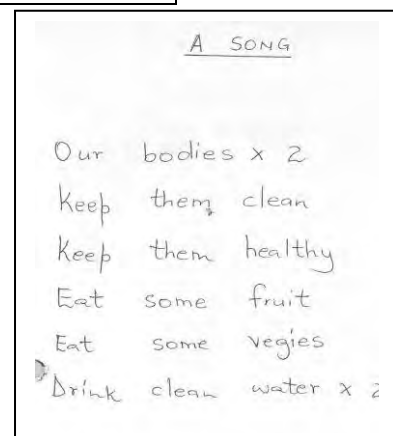
Grade: 2

Learning Unit 2

	LO	AS	Integration
Maths	LO5: DATA HANDLING The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation.	1. Collects everyday objects in the classroom and school environment according to given criteria or categories. 2. Sorts physical objects according to one attribute chosen for a reason. 5. Constructs pictographs. 6. Describes own collection of objects, explains how it was sorted, and answers questions about it.	Life Orientation: LO1: The learner will be able to make informed decisions regarding personal, community and environmental health, AS2: Participates in a problem-solving activity to address an environmental health issue to formulate environmentally sound choices and/or actions (NOTE this is a Grade 6 AS). NS: LO1: The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts; AS2: Conducts investigations and collects data (NOTE this is a Grade 4 AS).

Linked to food garden as with previous LP

1. Learners sing song about clean and healthy bodies (prior knowledge)
2. Learners collect data about what they eat in morn and afternoon – report back at school. Each food type is assigned a different colour and learners colour in circles to represent food eaten. All same types are put together.



3. The collected data is presented in a pictograph by the teacher (large format on wall)



4. Teacher tells learners what needs to be eaten for a balanced diet. Teacher asked questions e.g. how often do you get food?

QUESTIONS

- How often do you get food?
- Why don't you eat in the morning? What does your parent do to solve this problem of not having food?
- Who gives you food?
- What is your diet?
- Which food is eaten the most?
- How much food does your parent give it to you?
- Is it cold or warm?
- Does your parent change the diet?
- Is the diet you eat balanced?
- Why do you say it is balanced?

5. ASSESSMENT TASK: Learners copy pictograph onto worksheets and answer questions.



APPENDIX G: SCHOOL AND COMMUNITY PROFILE

TCP11

Schools and Sustainability – Border Kei

Teacher and Classroom Profile

1. Name **NOLUNDI VIRGINIA NKOTLA**
2. School **GWABA COMBINED SCHOOL**
3. District **EAST LONDON**
4. What is the primary language spoken by your learners? **ISIXHOSA**
5. What other language/s are spoken by your learners? **ENGLISH**

6. Which Learning Areas and Grades do you teach?

LA	Grade
Language ISIXHOSA (specify)	5, 6 & 7
Mathematics	
Natural Science	5, 6 & 7
Social Science	
Life Orientation	
Technology	
Arts and Culture	
EMS	5, 6 & 7

7. What is the average size of your classes?

Number of learners	Tick (✓)
0-15	
15-24	✓
25-29	
30-34	
35-39	
40-44	
45-49	
50-54	
55-59	
60 or more	

8. List your formal qualifications

SPED, Senior Primary Teachers diploma - Rubusana College
FDCE - University of Pretoria
B.Ed (Foundation & Intermediate phase) - University of Fort Hare

9. List and describe any programmes you have been involved in to support environmental learning in your teaching.

4 h programme where we have food garden in our school helping learners in the foundation phase who are stricken by poverty.

HAC - We helped vulnerable learners by collecting clothes and involve community members to make food garden and support them with vege.

10. Briefly describe any issues in your classroom and/or school context that hinder your teaching activities

Poverty hinder my classroom activities. A hungry child cannot learn effectively. Jam bread is not good for child the whole day. Language is also the barrier to my teaching activities. Long distances - My school is supported by learners from different farms. They travel long distances. They take 2 hours to get to school.

11. List and describe the in-service training you have received during the last three years. Also mention who was responsible for providing the INSET (e.g. DoE, NGO[name], university[name], etc).

Intel teach - NGO -

- ① Intel Teach Computer - How to make project on a Computer
② Edusol Sams - System, Management and administration of school using Computer.

12. What do you understand by the term 'environment'?

Environment is everything that is found on the earth. It involves the land, water, air, people, animals and plants.

13. What do you understand by the term 'sustainability'?

To continue and strengthen something. To revive e.g. not to destroy the environment.

14. Describe the knowledge/skills/values that you have or need to develop as a teacher in order to support environmental learning in your classroom

	I have	I need to
Skills	Appreciate Environment	Transform my school and community to be environmental participants
Knowledge	Environmental Issues	Prepare lessons that address issues of environment to learners
Values	Do not litter, Recycle	To make my learners keeping their environment clean home, school & community.

15. The Department of Education in the Norms and Standards for Educators policy document proposes a number of roles for teachers. Consider these roles, whether you feel that teachers should take on these roles and comment on how you relate to these roles

Role	I think I should take on this role (✓ or x)	Comment
Learning mediator	✓	I have to transfer the knowledge of Curriculum to learners.
Leader, administrator and manager	✓	I have to lead the learners by example, record work and exercise discipline in my class
Interpreter and designer of learning programmes and materials	✓	I have to plan and prepare my work. I have 3 stages of planning, Learning Programme, Work Schedule & Lesson plan
Scholar, researcher, lifelong learner	✓	To be clear about the curriculum and find solutions to the problems and learn to acquire more skills and knowledge.
Community, citizenship and pastoral role	✓	A school is a learning community. Community members should be involved in the school. I also have to console where necessary and help the desperate learners.
Assessor	✓	I should assess the progress of learners and give them room for improvement & Motivate.
Learning area specialist/subject/discipline/phase specialist	✓	I should know everything about the learning area and learn more about it.

16. Number the teaching and learning methods you use from most common to least common

Method	Number
Field work (e.g. auditing or ecological studies in school grounds, nature reserves, etc)	2
Practical classroom work	1
Lectures	2
Learner information research (e.g. in library, clinic, local experts etc)	1
Learner community research (e.g. interviewing family & general public)	3
Learners copy work from board or textbook	4
Classroom experimentation	2
Other (specify)	
Other (specify)	
Other (specify)	

17. Briefly describe the learning and teaching support materials you commonly use in your teaching and what topic/theme these are used for.

Type of material	Description	Topic/theme/issue covered
Text book		
Text book		
Government/municipal publication		
Government/municipal publication		
Activity pack	Waste management	Littering
Activity pack		
Fieldwork kit		
Fieldwork kit		
Magazines/newspapers		
Posters	Poster I get from Environmental World day.	Environment.
Other (specify)		

18. Please feel free to add any other information you may feel to be relevant.

Thank you for taking the time to complete this questionnaire!

**APPENDIX H:
TEACHER AND CLASSROOM PROFILE**

SCP10

Schools and Sustainability – Border Kei

School and Community Profile

1. Name of school GWABA COMBINED SCHOOL
2. Province and district EASTERN CAPE - EAST LONDON
3. Closest town EAST LONDON

4. What grades are offered at your school?

Grade	Tick (✓)
1	✓
2	✓
3	✓
4	✓
5	✓
6	✓
7	✓
8	✓
9	✓

5. Are any environmental education activities taught/provided for at your school?
Specify NO

6. Describe any projects your school is engaged in to respond to environmental and health issues faced with the school and community.

YH and HAC - Health Advisory Committee.

7. List a few examples of environmental education teaching and learning support materials and other resources that are available at your school

None.

8. Do you have access to environmental education resource materials/support services outside your school? If so, list examples

NO

9. Is your school governing body supportive of environmental learning in the school? Elaborate and mention examples if applicable.

Yes, because they are part of the food garden in my school.

10. Is your school principal supportive of environmental learning in the school? Elaborate and mention examples if applicable.

Yes - She does support me when I ask to share information with her or my colleagues.

11. Briefly describe the socio-economic context of your school

11 My school is situated in a place where there is high poverty. Learners come to school hungry and they travel long distances from farms. The Dept makes promises that they don't fulfill. Learners are sexual active and high rate of alcohol abuse.

12. Briefly list and describe any environmental issues or problems in or near your school.

Littering is an environmental problem in my school.

13. Briefly describe the relationship between the broader community and your school. Provide examples of collaborative activities if applicable

Parents and teacher work hand in hand to develop the school. There are parent who helped us with the vegetable garden.

14. Please add any other information you may feel to be relevant.

I hope this environmental education will help us to improve our schools environmental problem

Thank you for taking the time to complete this questionnaire!

APPENDIX I :

OBSERVATION NWABISA (CODE ONM1)

Date : 2008-08-21 Data source: Research Journal 1 – pg.s 37-39

School: Mbanyaza

Grade 1

LOL: Xhosa

Teacher and Classroom Profile and School Context

Nwabisa is a cluster leader

The school caters for Grade 1-7.

The building is made a brick and is in good condition and has sufficient space to house all the children (Max 24 learners per class).

Teachers used to live on the school grounds and there are old buildings still there in which they used to stay. They left because of theft.



The school has a garden. Last year the Grade 7s grew veggies in it to raise funds for their tour. This year it is the responsibility of the Grade 1s and Nwabisa is managing it because of the EcoSchool links and because she would like to use the veggies to complement the school feeding scheme (presently with this scheme the learners receive a slice of bread (with butter or jam) and a fruit juice each day). The Grade 7s help in the garden though as they are big enough to handle the equipment.



The beds planted by the Grade 1s recently planted

Mulch provided for warmth for seeds

There have been problems with people from the community coming over the fence and stealing veggies, but Nwabisa feels that they have had success talking to the community and asking them to be vigilant and identify culprits for the sake of the learners who benefit from the garden.

The school has been getting advice from a community gardening project which grows and sells veg to the community (see the brown patch in photo below for view of community garden).



Toilets are in good buildings – they are pit toilets. They are kept clean by a teacher in charge of learners. On certain week days, latecoming learners are given the task of cleaning the toilets.



Other latecomers are given others tasks such as weeding the garden and picking up papers.

The school has a pit for rubbish. The learners are good about not throwing rubbish around. But the rubbish from the pit gets blown around by the wind and is difficult to manage. Every three or four days one of the teachers organises for the rubbish to be burnt. Also, to manage the litter, learners are expected to pick up litter after each break.



The school has functioning rain tanks



Nwabisa has started a rockery. She is looking for hardy plants for the rockery



Lesson Presentation

Nwabisa started with a story she had written herself. She asked questions as she went along to engage learners in the story. She even got them involved in doing action – e.g. the ambulance coming to pick up the sick girl.



Afterwards Nwabisa translated the story as follows:

There was a young girl whose mother was a hawker selling chips and sweets. Every day she would go to her mother who would give her chips and sweets. She would eat these and then go home. When her mother got home late to feed her, she found her daughter not interested in food. The girl started to get weaker and weaker and one day she collapsed. The neighbor called an ambulance who took her to the clinic. At the clinic they found that she had rotten teeth and worms. At the clinic they said her family should start a garden at home.

*During the story Nwabisa asked the learners what they should plant in this proposed garden and asked them to come up and point out fruit and veg on the posters she had on the wall.

She then showed them a food pyramid with different food groups asking them to point out individually what they had had for supper the night before – making the point that they should eat from each of the different sections in the pyramid (carbs, fruit, veg, protein and sweets treats)



Then she stuck up different foods on the board with prestik. These represented healthy and unhealthy foods.



Nwabisa then drew two baskets on the board and asked the learners to move them one by one into the appropriate basket. When a child got one wrong Nwabisa asked “Is that right” and the others would be encouraged to correct until as a group they produced the right picture.



They then sang a song about food. Nwabisa gave them a worksheet with the same foods and asked them to colour in the worksheets and draw lines joining the foods to the appropriate healthy or unhealthy basket.

During this worksheet the learners started singing a song about picking up paper and some ran around the classroom doing just that –although the classroom was very clean and there was not much around.



Learners at first appeared to be putting more energy into the colouring than the joining activity ...

APPENDIX J:
INTERVIEW – NWABISA– MBANYAZA (KWT) WITH NOMBEKO IN
ATTENDANCE (EXTRACT – 5 out of 22 pages)
(CODE: I3)

Date: 2009-05-06

I: Thanks for seeing us. Just a reminder that the interview is for the Schools and Sustainability evaluation of the course. We spoke about it last year. It is for the evaluation and also using the data towards my PhD. I am sure you are dying to hear about your file. You have definitely passed. You will get the marks from Laura once the moderation is completed. I have some interview questions. I wanted to find out about how you have experienced the course and also to take me through your file if there is time ...
So – the first lot of questions are more about you and the community. The next lot are about the course. So – a lot of this info I know already, but just to have on record. Our classroom, your grade, Learning areas etc.

N: I am doing Grade 1. We are doing three learning programmes. Numeracy, Literacy and Life Skills.

I: A typical classroom size?

N: Last year they were 24. This year they are 22.

I: Can you tell a little bit about the learners. Where they come from and what kinds of issues you deal with ...

N: Much as this is a rural area, these learners from this area are coming from illiterate people. They are staying with their grannies. Not dads and moms because they are working in PE and G'town. The main problem we normally have is that if you give them something like homework it is not easy for them to do it. Normally they are helped by the siblings who sometimes misinterpret the question or try to write for the kids so as to get the marks to be right. And secondly the granddads, they are very strict for them to come to school. They don't stay at homes. Like when it is raining or when it's cold they come to school because the grannies normally push them to come to school. And last year I had to write a focus on vegetable - the nutritious food, because you know the grandparents – the old ladies they like to cook stiff pap or just a samp and that is a meal. But last year we have tried to change that because initially maybe yes, there was an irrigation scheme here which was providing them with fresh vegetable. After the closure of the irrigation scheme, there were not – they didn't continue to do those vegetable planting and so forth and caring their ... only the individuals. I think the one who is still there is the old lady – 2km away. It is near to Themba. Otherwise they tried here last year after we have motivated them to have the small gardens from their yards. Otherwise they are flexible and the kids – we are trying to manage because we don't have too much learners in our school.

I: Has that been successful? Are they starting gardens at home?

N: So they say. Yes. I would say they are doing because department of agriculture. The local dept of agriculture in Peddie is now providing them with some seeds and vegetables, herbs, and ... and they are having something like projects now. I don't know whether we have had an impact or it just ... um.

I: Did they work through the school?

N: No. We liaise with them through the kids because we normally say to the kids, please do this and this at home. Please try this at home. And the Department of Agriculture is also trying to help them in terms of motivating them since there was that irrigation scheme.

I: Can I ask you about your interest in environmental education? How did you first get interested?

N: The first person who made me interested in this thing is Nombeko. And she made this thing very interesting when she was learning it to us in the cluster meetings. The very first time she was sharing this thing she told us about opportunities, she told us about its value in terms of environmental. So we were interested. In fact I was interested and I bring it back to my school. Otherwise, initially I didn't have that question. I was only told and I come to my school and I see – "Oo – if we can do this thing at a certain stage we will be greening the school". You know this is a stony area. We told about greening. We told about nutrition, all those focus areas. That was how she was bringing it to us. So I come to my principal and I say: "Hey lady. Let's try this thing because it has the opportunities – it has so much".

I: Do you think that the course met your expectations?

N: I would say it met because now I have tried to move ahead with the environment. Though practically I am not the only one who is doing it. It is for the school. So they don't have 100% interest as I am having. So it is only now that they are beginning to be sensitive or trying to understand the environmental issues. Now that they know that I am doing the ACE. Because initially – this sustainability – I was something like weak to them. But I came this year and said I am going ahead with this thing. And I have tried to express my feelings to the principal. And it is then they are trying and beginning to – try to fit to this. Otherwise – if it was for me alone – I would, but the school sustainability includes the whole school.

I: It sounds like you have got good support from your principal and colleagues?

N: Yes. Even the SGB. We normally report and give the motivation that there is this thing that is going on in the district. So we have joined. It is going to do us this thing and this thing. And they are happy and they are trying to support us.

I: Can you tell me what makes a good teacher?

N: Attitude is the first one. If you want to be a good teacher, you must be positive and a good educator. But you need to be positive. You need to – you must love what you are doing. I don't know whether passion is the good word for it, but you need to love what you are doing. And you must do everything you want to do. You mustn't have limitations if you want to be a good teacher. And research is very important. Like I didn't know much about the environment. But through interacting with others – with teachers, they and the other pupil and I have also discovered that even here at Peddie there were teachers that were doing the ACE (EE). Through interacting with people, makes you, and it brings motivation and interest.

I: Who are the teachers that did the ACE course?

N: One of them is Mpofu.

I: OK. Yes I remember now. How is she doing? All right.

N: But she is no longer doing it.

I: No longer doing EE.

N: But – at school she is doing agriculture, so there it is something ...

I: So it also sounds to me like it's – the Schools and Sustainability wasn't quite enough motivation for your school to get enthusiastic, but the ACE – am I understanding you right? – made the connections stronger? You do something worthwhile.

N: Yes

I: Is there anything in the Schools and Sustainability we can do to make that motivation stronger? Are there any limitations of the S&S? That makes you struggle to get support from your colleagues?

N: To me – I don't think it was the course. It was just for them – you know in environmental studies. Even in the olden days. It was not something that was taken up by teachers. They used to do it when they are tired or afternoon. Or ... it was not like the other – Maths and – so if you are doing it – to them it was just when I begin to do the Schools and Sustainability – it was just something like extramural. They didn't take it – much as they know that it appears in the policy, from their learning outcomes and assessment standards. But they didn't take it very serious.

I: So, is it just positive re-enforcement, hearing it again from one course and again from another course?

N: I think so.

I: What are the roles you are expected to take up as a teacher? Generally.

N: I am expected firstly to bring education to the learners. Then for their wellness. And then for their well-being. As a teacher.

I: Do you find that sometimes quite overwhelming to have all these different roles? Or is just something you are just used to.

N: I like to do them all. I like to do them all because when you do this one, you normally touch that one. When you do that one, you normally touch ...

I: In terms of environment work. Are there any problems/limitations that you are faced with, that means that you cannot do what you would like to do?

N: Let me take last year. Last year I had that – at the end I was supposed to do the vegetable garden. We wanted to do it, as much as because we thought we had much space outside. But practically, it was this of space. As a result others were unable to – the space is small. When I brought this thing here, initially – the Grade 7s were doing it as their way of raising their funds because at the end of the year they want those send-offs and farewells. So they normally do that – when they sell. So I said – “we must try and do more” so that we can accommodate everybody and each class to have a small piece of soil for each vegetable garden. We are working with the parent component - the SGB. But when we go there, it was very hard. In such a manner that even the tractor could not dig it. Even this year, we are not yet started the garden because even the tractor – they said it is not doing it OK. We only put this year the fertiliser on – from the ostrich. After it rains

we can try. Otherwise the soil is not doing what you want. As a result I said to the principal. It is so fortunate that the Eco-Schools – we need to do another focus. But that focus area – we said we are going to do the cultural something, because we are doing the vegetable garden. At the end when we said we must do the cooking – we have the cultural day where we could the indigenous food as so forth. But how are we going to plant the indigenous vegetables whilst we are having the limited garden here? You know. That is the problem we have. And we cannot do anything more than that because the chairperson of the SGB tried to check another place and you know – not unless we can wait for the rain tank. But the challenge ...

I: So you are still doing Eco-Schools this year?

N: Yeah. We are planning to do that.

I: So that was one of the problems. What about other aspects? What other important things. We spoke about waste management last time. Is that going all right?

N: No, we don't have problem with waste.

I: There is no litter?

N: There is no much litter.

I: So, what are your – what would you say your strengths are as a teacher. You have said what a good teacher is. Um – and personally.

N: Adventurous. I like the challenges. And I like – I have a potential to educate. If I like something – I know that I can engage. If I like it – Ingrid – to do those things – definitely I will do it. That is my strength. I can influence. Just like my principal who is doing it, but is not hands on, but if you can ask her [can't hear] And the other teachers – like next there is another teacher who is saying I am joining this EE next year.

I: So where do you think you need help or improvement in terms of professional development?

N: Sometimes you think things – you are – if you are in an exam – you write the test, then you see your shortfalls. Then – otherwise, then you think you are doing OK. You are doing OK. I am not sure of my weakness until I come to the ?? I am not sure – I don't entertain failure until I fail. Then I know that 'Ay I didn't know this and this'. Otherwise as I am coming I know that I am going to ... so that is why I am going to know where do I – until somebody tells me that you need to improve ...

I: And then when they tell you, so you see and understand.

N: Yes, I see and understand and try to improve. And I ask you again ... how do I do now?

I: OK. Right. Has the course met your expectations? Is there anything more you want to say around that?

N: That –course motivated me as an individual because now, as I told you. Now I have moved on. I have tried to incorporate the environmental theme. But practically, there are challenges. And that you are given that you must focus to the – to this focus areas, then you must focus to it. Even if you see now that "Hey, this thing is irrelevant". The things ... because towards last year, when we tried to – when we planning the year, we touched

this thing that – now that we are having this challenge of vegetable garden, what must we do in terms of the focus areas. Are we going to go with this vegetable garden. But I said we musn't throw it away. And there was a lady that was starting doing traditional dancing using these kids. And the principal. No, we must try and organise that lady to come to school. Then we take this cultural focus with heritage and ... So that is why we are having – and we try to organise the other parents to try and – if we do have the cultural day to prepare those indigenous foods.

I: It is nice how you have managed to make a link between environment and culture through the food.

N: We thought of the food because last year we are dealing with food. And that problem made us to do that vegetable. We are still having ... even if we are saying we are changing it to culture or ...

I: I am just thinking around your garden problem. Have you explored or does anybody know about alternative garden practices that might help you dealing with low rainfall and bad soil? For example trench garden?

N: I never tried it – otherwise I have not heard of it.

I: Trench gardening is a permaculture thing where they dig a plot the size of a door. You must dig a trench a spade deep. I think you may have trouble ...

N: We saw it when we were at ... but I never tried it here at school.

I: It might be worth growing – trying different systems. If that is really important to you and you keep on coming back to it – nutrition and the garden – so you know – maybe you can invite someone to help you - somehow you can find information about it.

Nombeko: From the department of agriculture also.

APPENDIX K:

ANALYTIC NODE 1: HISTORICAL REVIEW OF *SCHOOLS AND SUSTAINABILITY COURSE*

Teacher professional development

Doc number	Pg. Number	
2	6	Focus on resource-based learning and research-based implementation
2	57	The curriculum review team proposed strengthening the cascade model with cluster and school-based models
2	59	Gauteng province used a cascade model
2	58	"Curriculum support service staff lacked the experience and thus the confidence to facilitate environmental education professional development practices"
2	62	teachers' portfolios provided the teachers and researchers with evidence [of active learning processes] which they discussed during interviews, reflective meetings at the schools and in evaluative reflections of teachers' own portfolios.
2	65	"evidence from the portfolios suggests that many teachers still need to develop more expertise in planning curriculum activities that are appropriate to the required scope and depth of the curriculum".
2	66	Research "highlighted the importance of practical, implementations-based approach to Curriculum 2005 professional development which takes as its focus the learning processes in schools".
2	66	"key to supporting teachers' professional development interests seemed to be the role played by support groups in the context of the project, including the researchers, the curriculum implementers and the provincial partners"
3	14	In the province they modelled cluster-based approaches to professional development within the spiral model
3	21	teacher clusters were established at district level - these were co-ordinated by subject advisors and supported by service providers - Makana was one of these - with Rhodes as the Higher Education Institution to support it. Also KWT - with Nombeko as the subject advisor. Makana cluster was co-ordinated by the RUEESU - supported by Didi as subject advisor. In KWT the frequency of activities was less intensive "possibly due to an absence of service providers to initiate and drive the process"
3	24	The Makana District PD processes "were framed within the spiral model, engaging teachers in ongoing processes of curriculum design and implementation through a series of ongoing processes of curriculum design and implementation through a series of work together and work away tasks"
3	24, 26	teachers developed a "professional development portfolio .. And encouraged to engage in ongoing processes of action and reflection as they developed and implemented lesson plans"
3	25	The PD portfolios "had the dual purpose of providing for a collection of evidence of professional development and supporting the development of teachers as reflective practitioners"
3	25	By compiling the portfolio teachers were able to be issued with a Rhodes University Certificate in Environmental Education "This entailed the rigorous assessment of the portfolios according to the professional development outcomes of the project"
3	25	The process of portfolio development enabled the development of practical, foundational and reflexive competence
3	26	The national NEEP-GET project developed a set of professional development outcomes which were used to guide the clusters in the Eastern Cape (including the Makana Cluster).
4	6	Teachers need methodological support to strengthen interpretations of learning outcomes and assessment standards
4	7	educators need to be supported to ensure adequate scope and depth for different grades and phase requirements

4	7	Educators need to understand the context of learning and learners in more depth
4	7	There is a need to support educators to select and adapt LTSMs in the context of LOs, for lesson plan development and use with learners, to scaffold learning
4	9	There is a need to provide educators with opportunities to explore understandings of learning in more depth
4	12	"There is a need to slow down the process 'training' offered in curriculum directorates, to ensure meaningful participation, feedback, review and improvement and to reduce the 'one-way' transfer of information process that characterises 'once-off' training programmes. The cluster-based approach, framed within the spiral model was found to provide a mechanism that allowed for meaningful participation, feedback, review and improvement of practice - a continuous process of professional development"
4	12	INSET should be a responsive process which should "explore ways of being positive about educational change, and should continuously seek alternatives and be responsive to changes in context, and educators' experiences and needs"
4	12	"Professional development within a transformational framework requires attitudinal changes and a paradigm shift, where an emphasis on quality is as important as an emphasis on quantity"
4	12	"Professional development processes should be carefully aligned with policy"
4	13	"Cluster-based professional development is an appropriate model for enabling the development of applied competence ...[it] needs, however to be ongoing over a period of time, and it needs to have a clear framework and programme (outcomes to be achieved over a period of time). There is evidence that this model of professional development is being interpreted differently in the DOE, where cluster-based approaches are seen more as an organisational/structural framework for organising teacher meetings, rather than as a site for supporting and developing applied competence amongst teachers"
4	14	there is a culture of curriculum support based on "short term training"
4	14	There is a need for a professional development system
4	15	Successful clusters depended on: integrating the cluster approach within the district strategy, DoE working closely with partner groups, CS staff being allocated time and resources
4	19	An action research approach - with a focus on reflective practice was key to TPD programmes. This requires "ongoing, careful scaffolding, and a practical orientation" and "structured support is needed to encourage rigour and reflexivity"
4	19	"Reflexive practice requires educators to apply what they are learning, and to reflect critically on the application of the ideas in practice"
4	19	"Reflexive practice requires models of professional development that enable ongoing reflection on practice and the ability to effect changes where and when necessary"
6 and 7	3	PD process" is driven by a spiral curriculum model consisting of work-together and work-way tasks, with discussion and reflection on progress and school-based implementation during regular workshops" - 2002 Makana
6	3	"In the teachers' portfolios, for each theme, they assess themselves against the professional development outcomes developed for the NEEP nationally" - 2002 Makana
6	10	Teachers struggled to complete all activities given to them - ending with a backlog of work and a need for 'catch up' workshops
7	6	Strategies used for reflection on professional development by teachers: 1) reflection on LOs as designed by the NEEP; 2) reflection clover; 3) Specific questions about work together and work away tasks; 4) space for general reflection
7	8	"Teachers struggled to work with and interpret the RNCS for their learning areas. Didi Maselana made a number of personal visits to the schools to help them in this regard. Teachers' portfolios show evidence that this extra commitment has helped them a lot. Also teachers have personally commented that the work with the formal curriculum that they have done through the Makana Project has helped them in subsequent DoE workshops"

7	11	"While teachers had the ability to reflect informally on learners' development of awareness attitudes, knowledge and skills, few provided evidence of this by linking their comments to the evidence of learners' work provided in their portfolios"
7	13	"we struggled to get teachers to complete three LUs during the course of the year. At times we considered reducing the number of LUs to two, but on consideration, we noted that the teachers are expected to develop LUs throughout the year, so that to expect three with an environmental focus should not be too much of a problem. It is important, as noted above, that LUs are developed in such a way that they become part of the teachers' normal course of work and not an additional project which they struggle to complete"
7	12	The NEEP-GET professional development outcomes were a useful within which teachers could reflect on their own professional development. Two of the teachers did their survey successfully, while other teachers, besides their obvious commitment to their own professional development, struggled to conceptualise their own development within a formal framework"
10	6	Course co-ordinator recommended the use of good lesson plans and case studies of different learning actions
10	7	Course co-ordinator felt that we need to select one learning area and work through that thoroughly
10	18	Teachers justify the activities - simply explain the value of the lesson and "assume the children do learn what they intended them to learn. They don't probe the educational value of the learning process in enough depth".
10	18	"Often teachers' reflections are not well explained or justified and there are no references to learners' work to justify the teachers' views. The teachers' portfolios revealed a general lack of critical and analytical thinking"
10	20	Teachers reflections tend to focus on logic and feasibility of the lesson as indicators of success -they don't really look for evidence of learning
10	20	We need to emphasise that SKAVs are indicators of whether LOs and ASs have been achieved
10	21	Most teachers struggled to reflect on the policy at all. One that did looked at obstacles which prevented /constrained implementation of some areas of the SEP; she gave ideas on how the SEP might be improved the following year; and how it might be better co-ordinated
11	2	In the evaluation teachers said the course helped them understand new ways of teaching
11, 12	2	some said they had learned more from the course than from the RNCS workshops conducted by the DoE
11	3	Analysis of exemplars (new introduction?) was useful to teachers
11	4	"teachers generally struggled to discuss evidence of learning"
12		
12	19	Teachers appeared to have difficulty in aligning LOs, ASs, activities and assessment criteria
12	19	Teachers need more support in unpacking LOs and ASs in the different learning areas
12	19	When teachers adapt materials they need to think how this affects alignment with LOs and ASs
12	20	few teachers commented in depth about their lesson plans
12	20	in some cases teachers chose inappropriate resources to support lesson plans
14	2	Nombeko Nxinga attended a Rhodes certified capacity building course for tutors as part of her involvement in the Schools and Sustainability course - she achieved the certificate
17	15	This was a model of training and information dissemination whereby "information or content knowledge was passed down a chain of education officials, inspectors, subject advisors and then finally on to teachers".
17	7	The Learning for Sustainability Project was an internationally funded environmental education teacher professional development course run in Gauteng and Mpumalanga (between 1997 and 2000).
17	22	See diagram of the spiral model for teacher professional development. This enables deepening knowledge, skills and competencies; increasing sophistication; increasing confidence, trust and professionalism; and the development of symbolic capital, meaning and conceptual familiarity. This is dependent on professional development over an extended time period.
17	24-25	Document details ten features of the spiral model
18	12	The cascade model with 'once-off' training schedules was considered "inadequate for initiating deep change and transformation".

Whole school development

Document

Number Pg. number

2	66	"teachers needed a support base at the school, amongst their colleagues. This was associated with a lack of confidence in some teachers to implement new ideas, and with resistance from senior teachers. A team-based approach to curriculum innovation and implementation was recommended, as this facilitated confidence building, and made it easier to withstand and overcome resistance in the school context".
2	84	"A curriculum implementer from KZN recommended the establishment of local forums and networks in support of environmental learning in schools"
10	5	Some teachers had difficulty getting time off for workshops and struggled to persuade principals to support SEP work and action plans
10	11	"Some teachers struggled to persuade other teachers to cooperate with them in a school environmental working group. Professional jealousy seems to have been one of the reasons for this lack of cooperation"
10	11	Learning programme development with an environmental focus was difficult as teachers did not always get support from their colleagues or found that only the management team was responsible for LP development

Partnerships

Document

number Pg. number

2	88	Partnerships between DoE, DEA&T and DWAF to provide materials and support maximised the environmental, educational and financial resources for the project.
4	21	There is a need for a co-ordinator of environmental learning to maximise resources and support of partners and providers
4	22	Intergovernmental partnerships need to be formalised
14	1	Schools involved with the 2007 S&S course were chosen because of links to the Department of Agriculture 4H programme

Curriculum Issues

Document number	Pg. Number	
2	30	"Exploring the complexity of environmental issues requires knowledge and skills from a range of learning areas
2	33	EE Processes associated with the different learning areas will need to be developed in a coherent and interrelated way pg. 36 "the emphasis remained focussed on curriculum structural features rather than the pedagogical processes in curriculum"
2	43	"In many cases teachers were unable to make the connection between the curriculum planning framework (learning outcomes, active learning framework , assessment) and the actual activities that were implemented".
2	43	"The activities appeared to be implemented to 'involve the learners' but it was not clear why the activities were undertaken, what their purpose was in relation to the learning outcomes, or to the learning areas"
2	67	Lfs findings (Lotz-Sisitka & Olivier, 2001) were confirmed in the NEEP-GET: that "teachers appeared able to design activities around a particular environmental issue or risk, and link these to specific outcomes from different learning areas (using an integration across the curriculum approach), the design of the activities did not necessarily further the aims of the learning area, or involve a deepening of knowledge or process skills from specific learning areas".
2	68	"without a clear focus/orientation to environment in the each learning area, teachers tend to mis-interpret the learning area focus when working on environmental topics, issues or themes, which often lead to activities with little substance of focus".
2	68	"a traditional 'thematic approach' to environmental topics (water, waste) seemed to be widely used in schools, The traditional thematic approach involves choosing a theme or topic and designing a range of language, maths, science, music, art or other subject or learning area based activities that link with the theme or topic .. [this] can provide much variety, some continuity of focus, and enable the development of interesting activities that are linked through the theme topic or focus, particularly if the learning area focus is sustained in different activities".
2	70	However sometimes links between different learning areas or links to the environmental risk or concern can become superficial or trivial.
2	70	the NEEP-GET document implies that if activities are developed around a "locally contextualised focus or issue" these links can be strengthened.
2	70	some teachers struggled to see the relevance of EE processes and saw them as an 'add on' to mainstream curriculum activities.
2	71	"researchers [in the NEEP-GET project] emphasised the importance of conceptualising environmental education processes as integral to all learning areas".
2	72	Units of work should "draw on, and apply the environmental foci in different learning areas, when addressing environmental issues and risks in local contexts".
2	78	researchers felt that "assessment was not satisfactorily dealt with in the orientation materials".
2	78	"teachers tended to make plans for assessing learners or activities rather than learning outcomes".
2	80	"most of the activities that were being conducted were focussed on the assessment of co-operative activity".
2	80	"teachers seemed very reliant on pre-designed assessment sheets distributed by Education Departments, publishers and projects. This appeared to be one of the contributing factors to the 'generic' nature of the assessments taking place".
2	80	"from all the pilot schools only two assesement sheets were focussed on assessment of process skills or knowledge in different learning areas (and in one case the assessment sheet was not used)".
2	81	Authors propose an assessment framework for active learning that involves: "An interactive assessment of prior learning, experience and community knowledge to enable learners to focus on problems in meaningful ways; assessing learners' insights and competence for making better environmental management and lifestyle choices; and assessing learners' abilities to collect and analyse data; document evidence; select options; negotiate trade-offs; design investigations to research and audit issues, demonstrate action competence; work together co-operatively and report with technical accuracy in an organised manner"

3	23	The NEEP Makana Cluster was supported by Didi Maselana from the DoE (the only primary schooling subject advisor in the Makana District). The programme was funded by WWF- SA - allowing for an intensive programme of support
3	28	teachers experienced difficulty in "making clear links between issues identified as foci for lesson plans and their relevance within specific learning areas. The co-ordinator reflected that a lack of engagement with curriculum documents might have limited teachers' capacity to establish such links"
3	29	Assessment tool lacked linkages to learning outcomes and assessment criteria
4	4	starting point for school-based curriculum development work should be "Curriculum in context"
4	4	the above includes "exploration of methods and learning processes appropriate for each learning area and learning context, and of the environmental focus within each learning area and learning context"
4	5	It is through emphasising the <i>relationship</i> between human rights, social justice, inclusivity and a healthy environment; that the social goals of equity, transformation and sustainable development can be met (the dimensions of this principle should not be seen as separate issues)
4	5	the principle needs to be interpreted in the context of learning outcomes, learning context and assessment standards
4	6 to 7	It is more useful to see environment as integral to a learning area than as integrated across learning areas. "An approach to curriculum which emphasises environment as integral to different learning areas has the potential to ensure better quality integration"
4	7	"Exemplars developed in the project show that a focus on environment is a key concern of democracy, particularly when viewed within a rights-based /social justice framework in a post-apartheid South African context"
4	7	There is a tendency to neglect assessment as this always tends to be addressed at the end of lesson planning work
4	22	"There is a need amongst service providers to put curriculum at the centre of their thinking, rather than individual or institutional priorities"
6	6	"All teachers managed to link their activities to the school curriculum and developed learning programmes for their learning areas using an active learning framework. Each teacher developed (and implemented with learners) two learning programmes based on an active learning framework. The first learning programme was developed on 'waste' or 'water and hygiene' and the second learning programme was developed on 'nutrition', 'tree planting' or 'medicinal plant use'"
7	4	"The partnership between Ms Maselana and the RUEESU have resulted in greater understandings and improved practice by both partners in terms of portfolio and curriculum development particularly"
7	6	"teachers each developed three environmental learning units. All teachers managed to link their activities to the school curriculum"
7	12	Teachers "need to be able to see and make concrete connections between LOs, ASs, SKAVs, activities and assessment criteria"
7	10	"There were cases where the focus on learning outcomes and assessment standards resulted in the teacher and learners losing (unnecessarily) the environmental focus. On the other hand, sometimes the environmental focus of the activity resulted in a loss of focus on the requirements of the learning area"
7	7	there was a stronger focus on assessment in 2003
8	10	LP template was adapted to split assessment into SKAVs. "In spite of this, this was the weakness of most concern in the portfolios"
8	12	Extract from feedback to teachers: "Be careful that you chose LOs and ASs that relate to your activities (and vice versa). Don't try to be too ambitious in clustering and integrating TOO much as you may end up saying that you will assess learners against something that you are not able to provide opportunities for!"
8	12	Extract from developmental feedback to teachers: "There are places where you need to question whether you are designing activities which are going to challenge learners appropriately. For example, is naming, drawing and colouring in vegetables a sufficient challenge for Grade 6 learners? You need to look to assessment criteria for guidelines as to the depth of skill, knowledge etc expected of the learners".
8	14	Extract from developmental feedback to teachers: "Be careful of making a statement such as 'they changed their attitude to litter' when all you have to assess this is a graph. How can such a graph tell you this about learners' attitudes?"

9	4	In learning Unit 1 teachers were given a refresher on the RNCS. They then spent time identifying LOs in their LAs that they could use to plan a lesson for environmental learning
9	5	Learning Unit 4 focused on assessment methods and techniques and teachers had to design lessons with assessment tools
10	19	"Teachers don't seem to have a good understanding of the LOs in their own LAs. They simply pick up on keywords and don't think very carefully about how relevant their choice of LOs and ASs are"
10	20	Criteria used in rubrics must be clearly linked to the LOs and ASs being developed and assessed
11	4	"many assessments do not relate to the learning area skills and knowledge"
11	5	"some teachers get distracted by the environmental focus and do not pay enough attention to the learning area requirements"
11	5	LOs interpreted superficially
13	18	Clear links between LOs and ASs and activities were made when teachers drew on guiding materials. When they had to make links themselves, they struggled
13	18	Teachers worked with ASs selectively avoiding those aspects of the ASs that require critical thinking and focusing on those aspects that deal with the reproduction of knowledge
15	6	In Learning Unit 3 (out of three now) (2005 course) participants focused on "assessment, review and forward planning"
16	4	Learning Unit 3 of the 2008 course focused on "Assessment for learning and planning environmental learning programmes"
16	4	In 2008 LU2 continued a strong focus on highlighting environmental focus in the first principle, the scope and features, the LOs and ASs and the content

Learning and teaching support materials

Doc number	Pg. Number	
1	3	"The NEEP recognises the importance of learner support materials to implement environmental learning" Resource packs included learner support materials to enable different kinds of activities: 1) Information resources (fact sheets, articles and posters) ; 2) Resources that facilitate investigation and questioning (audit booklets, maps and questionnaires); 3) Resources that help learners to take action and report on their action"
2	47 52	"It is, however, not only the accessibility of learning support materials, but teachers' and learners' ability to use resources materials, and the difficulty of providing accessible, adequate learning support materials in 11 different languages that are causes for concern. For example, many of the researchers commented on the difficulties learners had with the 'level' and 'language' of the LTSMs provided in the NEEP-GET pilot project". The more complex materials tended to be less widely used
3	30	In the Foundation Phase, teachers drew substantively on the yellow foundation phase booklet for lesson plan design
4	17	Teachers need help to select and adapt LTSMs
	17	Teachers need support to develop supplementary materials
	17	Educators need to support learners to use LTSMs particularly through language support
	17	teachers need help to contextualise materials
	17	Using a variety of LTSMs provides conceptual capital to take teachers and learners beyond what they already know
	18	LTSMs need to be more curriculum focused
	18	We need to rethink how materials are USED and not assume that difficulty requires them to be reworked
	18	"Partner-based materials needed to be supported into use where possible"
7	4	"One of our partners is the Health Promoting Schools initiative - we have developed educational materials on health and hygiene which are used by Makana teachers in their learning units, and also some Makana Project schools are part of the HPS programme"
	11	"Other problems that teachers experienced were a reliance on libraries and textbooks that do not always have the required information"
10,11,12	12	Extract from developmental feedback to teachers: "I need to know what resources you used specifically. I need to know more than just 'books' or 'people'. You need to tell me which books and which people" Teachers found the resource packs useful and that they covered the three topics well
11	3	In the resource packs teachers appreciated ideas for lesson plans, as well as examples of appropriate LOs and ASs
	4	little evidence of learners using the materials; "Teachers generally give little thought to how the LTSMs they have used SUPPORT learning processes they generally comment only on how much the learners enjoyed the materials"
15	12	"DWAF has mobilised this course in order to work with classroom educators on an implementation-based testing of the DWAF [2020 Vision for Water] materials".

Situated Learning

Document

number Page number

1	8	The initiative provided two illustrative learning programmes and two resource packs on water and waste respectively
2	44	The project supplied resource packs with the understanding that "contextualised approaches to curriculum development require a flexible range of learning support materials that can be selected and adapted for use in a local context"
3	24	In the NEEP the Makana District focused on the "exploration of contextual environmental issues and developing responses to these in the school and classroom context"
3	24	"One of the issues arising amongst teachers was a tendency towards a more general exploration of issues, rather than honing in on how these issues manifest within a local context. Teachers appeared to have had little opportunity to engage with knowledge around specific issues and so attempted to engage learners in exploring these issues without having developed their own understandings and perspectives"
3	26	In order to explore issues in context, "teachers worked with learners to develop 'picture narratives' of local environmental issues. Teachers undertook a 'sketching scope' activity with learners to identify and draw environmental issues that were of concern to them in the school context. Based on these pictures, teachers were then encouraged to develop a narrative of environmental issues in the school context"
3	26	In the narratives "some teachers and their learners reflected more of a focus on environmental 'features' as opposed to environmental issues"
4	10	There are a range of processes that enable a better understanding of env issues and risks - e.g. greening projects, water projects, energy projects, environmental health projects, school resource management, celebrating environmental days, undertaking school-community investigations of local issues, fieldwork, and exploring local and indigenous ways of interacting with the environment
4	20	"Being contextually responsive requires development of an understanding of the social context in which education plays out, and the skills to respond to challenges faced by curriculum support staff and teachers"
4	20	"Contextual responsiveness requires a 'balance' between policy/project priorities, and local social and contextual needs"
5	1, 2	In 2002/2003 participants were helped to analyse their own situation through an enviro picture-building game and developing their own picture-narrative. They also conducted a school environmental audit
7	10	Teachers and learners need guidance in identifying local environmental issues, risks and concerns. All of this needs to be underpinned by a good understanding of the meaning of environmental issues, risks and concerns"
8	12	Extract from developmental feedback to teachers: "Not all of you seemed 100% sure what an audit is. Remember an audit is an activity to gain a deeper understanding of a situation, resource or activity. Remember to challenge your learners sufficiently and be careful of not doing something too superficial ESPECIALLY when you are doing the audit as a curriculum activity. Something too superficial will not enable you to meet learning outcomes at sufficient depth"
8	4	The learning units were "presented in conjunction with three packs of learning support materials covering three environmental topics: 'Greening and indigenous plants', 'waste' and 'water and sanitation'. "The packs serve as way of contextualising the curriculum and environmental education processes to which teachers are introduced in the Learning Units"
10	9	"The more open-ended the tasks are, the harder they are to assess. But we should avoid being too prescriptive in our assignment requirements"
10,11,12		This course gave three packs 1) WATER; 2) Sanitation; 3) Waste/air and energy -
12		these were developed as a response to teachers' needs who were given a choice out of 5 topics (water, sanitation, air, waste, energy)
11	4	"Some audits were not really audits". "results were not always well reported", teachers "must work with the findings of the audit" "must interpret the findings"
13	23	enquiries need to be accurate and meaningful so that "informed choices can be made regarding appropriate responses to problems and issues highlighted in local environments"

13	21	"The DWAF materials provided a comprehensive set of activities for helping teachers and learners to explore their local context. However, some teachers appear to have simplified some activities to the point that they no longer provide insight for a useful, in depth analysis of the local situation"
15	5	Learning Unit 1 focused on 'Context and environmental learning in the curriculum' "We will learn about environmental auditing as a tool for getting to know our environment better, and will use a variety of teachign and learning support materials from the DWAF 2020 Vision for Water pack to help identify, explore, act and reflect on environmental issues and develop a relevant lesson plan incorporating auditing as a teaching strategy. The audintg process will also be sued so as to identify environmental learning opportunities in your school"
16	4	2008 - LU2 - supported "Environmental enquiry lesson planning towards environmental improvement"
16	4	2008 LU1 - continued with basing curriculum decisions on 'establishing key environmental issues - through the picture scope activity'

Transformative practice

Doc
number

pg.
number

1



3	28	Reports reflected that there appeared to be some confusion between notions of action and activities, reflected for example in collecting leaves or making objects as forms of action taking
7	22	Higher order thinking skills such as evaluation should help learners to select appropriate actions and to argue for certain actions
13	21	"A number of reviewed lesson plans involved learners in enquiring into hypothetical situations. While these enquiries may have been useful in developing learners' language to enquire into situations, the lack of authenticity meant that there was wither no incentive for learners to respond to a water-related issue or responses were hypothetical"
	21	"indirect actions such as writing to the municipality and drawing of action plans to school and home, can often end in no action because the suggestions are unrealistic, because implications of implementation have not been thought through, or because powers such as municipalities, household heads or principals may not have the will or the means to implement the actions. In such cases learners may end up feeling disempowered by their actions"
	21	"Similar problems can arise when proposed actions are hypothetical as learners are not challenged (unless by the teacher and through careful critique of their proposed actions) as to the practicalities and social and political implications of their proposed actions. The other problem with hypothetical actions is that while cognitive understanding and values may have changed, no tangible change takes place in terms of school and community environmental improvement"
16	4	Learning Unit 2 of the 2008 course focused on "Environmental enquiry in lesson planning towards environmental improvement" - focus on enquiry AND action

Deliberation and Co-engagement

Doc number	Pg. number	
1	5	"Considering the biophysical, social, economic and political dimensions of environment helps us to understand environmental problems" - this view was promoted in the document
2	41	"Very few schools attempted any in-depth work on waste management systems, the more complex causes of waste production, or impacts of waste on the environment (beyond the superficial)
	43	one researcher reported that "the Grade 10 Biology learners and their educator served as the main sources of information as learners battled with the level of language used in the resources"
2	44	"Some learners mentioned that their parents were not able to help them either because they were not available or were not interested in what was asked of them"
	44	"One researcher noted that 'learners' involvement in the discussions were restricted in the sense that learners were mainly discussing answers to the questions raised by the teachers'
	44	"groupwork was applied to almost any activity. The strong focus on groupwork does not allow the individual learners to develop the necessary skills"
	44	the authors ref LfS project (Lotz-Sisitka and Janse van Rensburg) where "project staff noted that 'the emphasis on teaching without textbooks (a position put forward in the initial C2005 advocacy) seemed to deter teachers from using learning support materials, which led to the design of activities that were mostly reliant on what learners knew, or could deduce from a particular environment".
	47	Teachers need to "select and adapt LSMs to broaden their existing knowledge and experience of environmental issues and risks".
	66	Teachers struggled with "Expressing themselves in English, understanding and following what is happening in the workshops, reading and interpreting the more complex LSM, conceptualising and making new and foreign concepts their own"
3	14	In the NEEP the Makana District focused on the analysis of environmental issues generally in order to help teachers gain an understanding of the holistic nature of environmental issues
	27	"In EE processes, a strong emphasis is placed on values and attitudes, and to avoid values education (values are embedded in the principles of the curriculum) becoming impositional, there is a need for the development of critical thinking, and critical analysis of issues in context"
	28	In the Eastern Cape teachers were encouraged to explore active learning approaches to env learning through an introduction the ALF. However, reports reflected that "Many teachers continued to experience difficulty with understanding the implications and full potential of active learning and working with it in much depth. The focus of most programmes developed using the framework was firmly on 'action', with limited analysis of issues or justification offered for particular actions relevant to environmental issues".
4	5	Mobilising indigenous knowledge was explored as a useful starting point for school-based learning actions
4	6	Teachers often resort to 'old knowledge'
	6	There is a need to support educators to understand environmental issues and risks from local, national and global perspectives, and from within a human rights/social justice framework in order to ensure that the environmental focus in the curriculum is not superficially interpreted
	7	There is need to support teachers to develop foundational knowledge of environmental issues and risks, as many interpret these superficially. This affects the scope and depth of outcome interpretation and ultimately the learning outcomes of learners
4	10	Contributions from other government depts and partner groups provide important knowledge and information that can be used in exploring environmental issues and risks in more depth
5	1, 2	In the 2002/2003 course participants were introduced to a socio-ecological model of environment to help analyse environmental issues, they looked at different cases and pictures and discussed them from this holistic perspective
7	10	"future programmes need to focus on developing teachers' skills of analysing both general and local environmental issues, risks and concern in more depth"

7	19	"Teachers need to be supported to take learners beyond the simple transmission of knowledge ... and develop higher order skills (as required in the curriculum) such as evaluating, planning, analysing etc"
16	4	In Learning Unit there was an emphasis on information, as is evident from the title: "Environmental Learning in the curriculum and information in local context" (contrast with 'curriculum in context' in previous modules

Open-process Framework

Document number	Pg. number	
	Front	
1	cover	Note the picture on the front of this cover where 'action' appears to dominate
	6	Consisted of 6 questions: 1) What do we already know? 2) Who can we contact? 3) Where can we find information? 4) How can we investigate the issue in our local environment? 5) How can we do something about it? 6) What have we learned and achieved? With three key dimensions: Find info, Explore and question, Act and report. These centred around an issue or focus.
2	32	Framework refined with: * Deeper understanding of mobilising prior knowledge * clarification that the FOCUS was an issue, risk or concern * including the place for tuning in and concluding connections; * 4th dimension separated out
3	24	In the NEEP the Makana District encouraged the development of school environmental policies in order to encourage school-based environmental learning activities
3	27	"In the Makana cluster, certain foci were identified for the purpose of lesson plan development, including the exploration of conservation issues in the Makana District, personal and community health, and resource use"
3	24	In the NEEP the Makana District focused on active learning approaches to environmental learning
3	32	Through the NEEP "schools and teachers were introduced to the School Environmental Policy Programme and later the Eco-Schools programme, both of which served to improve the co-ordination of school-based environmental education activities. The Eco-Schools project was piloted and launched at a DoE function in November 2003 and in 2004 many clusters and school engaged with the Eco-Schools process as it seemed to provide a focus for environmental learning activities at school level. Twenty schools in the province participated in this programme and received their Eco-School flags in November 2004.
4	9	without an in-depth focus on teaching and learning processes, very little real change in teaching and learning practice can take place
4	9	Evidence suggests that "starting with school environmental policies and management plans assists schools and teachers to clarify school and community priorities for environmental learning and assists with learning programme development and work schedule development
4	9	school env policies and management plans assist teachers to make links between whole school development and curriculum implementation
4	23	"School environmental policy frameworks appear to provide schools with the opportunity to define their own priority focus areas, and then to invite support from a range of partners. This allows schools to maximize and draw on partner interventions and materials as needed in the school (rather than as presented by the partner group)"
5	1,2	The 2002/2003 course supported action through a focus on school environmental policies and action plans (based on their audits)
6	3	"Some students commented they are still struggling to develop lessons that provide opportunities for active learning"
6	3	most felt confident with active learning while some said "they are still struggling to understand active learning and apply it in their work"
6,7,8,9		The 2002-2003 course and the 2004 course both focused on "implementing and developing school environmental policies and management plans". The 2004 course dedicated 1 of 4 learning units to auditing the school, developing a policy, developing an action plan focusing on activities to engage learners in responding to issues around a particular theme (depending on needs of the group the group could select from 5 RBL packs - Water, sanitation, air, waste or energy)
5	1,2	The 2002/2003 course participants were introduced to active learning processes from mid-2002 and continued to work with this and develop and trial activities towards active learning throughout the rest of the course
6	4	"In the latter half of the year [2002] we began to respond to more of the issues that were highlighted through the environmental policy development process... we have worked together with service providers to develop; learning programmes with teachers around: Waste (with the municipality), health and hygiene (with Health Promoting Schools), Tree planting (with the Millennium Tree Planting Project), Nutrition (with Umthathi Training Project), medicinal plant use (with the Rhodes REFYN project)"

6	3	The 2002 course included "using an active learning framework for learning programme development" as one of the workshop foci
7	6	all teachers and developed learning programmes for their learning areas using an active learning framework
7	6	"They continued to work with the Eco-Schools Toolkit in 2003" [as well as in 2002] for
8	6	All participating schools registered with Eco-Schools. "In consultation with Kim Ward, we agreed that the portfolios teachers developed would be more than sufficient evidence for assessment for Eco-Schools status"
9	4	In Learning Unit 3 (2004 course) teachers were "introduced to active learning processes and tasked with developing lessons and learning actions using active learning" in order [in order to] contribute to [their] school environmental policy
10	6	"Teachers struggled to juggle the many requirements of the course as well as the seven compulsory Eco-Schools focus areas
13	23	"Eco-Schools may help many of the schools turn hypothetical actions in to real actions, to develop partnerships with organisations to follow up and develop alternative responses where indirect actions have not had effect"
15	4	"By participating in this course your school will also join the Eco-Schools initiative"
15	4	"Our course is informed by the same key principles as Eco-Schools, namely curriculum work, community involvement and environmental improvement towards whole school development. It is important to note that the curriculum aspect of Eco-Schools is the essence of this course and it is that aspect of the course for which you will be assessed. However, in order to make improvements in the environmental health and loves of the community, curriculum work needs to be integrated into the context of environmental management towards whole school development together with strong community links. Thus Eco-School requirements have been integrated into the course". "In each learning unit, the curriculum-focused aspects of the course are printed onto light yellow pages. These yellow pages are those that will be assessed for your Rhodes certificate. The Eco-Schools focused aspects of the portfolio are printed onto light green paper. These pages will be assessed together with the yellow pages for your Eco-Schools status at the end of the year"
15	5	In Learning Unit 2 (out of three now) (2005 course) "In this learning unit you will be introduced to active learning processes and be tasked with developing lessons and learning actions using active learning processes that will contribute to your school environmental policy"

APPENDIX L: NODE 5: MELD ANALYSIS

1M (non-identity)

Main interest	Focus
What is and what could be	Purpose
	Policies
	Mechanisms
	Social-ecological conditions(National, Eastern Cape and local)

2E (negativity)

Main interest	Focus
Exploration of agential processes that either reproduce what is or have the potential to transform what is to what could be	Underpinning information (abstract information which informed knowledge of absences and absenting processes)
	Methods and tools for investigating absences and absenting processes (qualitative and quantitative)
	Ways of representing absences and absenting processes (e.g. graphs, tables, narratives)

3L (totality)

Main interest	Focus
What should be	Reflections on totality with ethical underpinnings and/or understandings of the holistic whole and/or ideas grounded in the knowledge of 'possibility'
	Methods used to support reflections on totality
	Intra-personal/inter-personal interactions

4D (transformative agency)

Main interest	Focus
What can be (unity of theory and practice in practice)	Direct and indirect change
	Individual or community change
	Structural reproduction/morphostasis or elaboration/morphogenesis

APPENDIX M: LETTER REQUESTING TEACHERS TO PARTICIPATE IN EVALUATION AND RESEARCH

RHODES UNIVERSITY ENVIRONMENTAL EDUCATION AND SUSTAINABILITY UNIT

Rhodes University Department of Education, PO Box 94, Grahamstown, 6140
Tel: +27 (0)46-6038389 • Fax: +27 (0)46-6361495 • E-mail: i.schudel@ru.ac.za

20 May 2008

Dear Teacher

RE: PERMISSION TO ENGAGE YOU IN EVALUATION AND RESEARCH

As part of the Schools & Sustainability course we have a strong interest in establishing teachers' needs and contexts in which they work in order to improve the development and delivery of teacher professional development programmes and also to showcase the programme to current and future funders.

This year, as part of an evaluation for the National Lottery Fund (which is funding the course in 2007 and 2008), we are hoping to:

- collect information about the background of teachers, schools and communities
- take photographs and observing projects in the school grounds
- take photographs and observing classroom teaching
- conduct interviews with teachers on their views and understandings
- review portfolios (including on course activities, lesson plans, learning and teaching support materials and learners' work) to see how the teachers are engaging with the course.

Data collected for the evaluation would be used for two purposes 1) to compile a report for the funder and 2) to undertake an analysis of aspects of the learning interactions in and through the course. This data will also be used towards a PhD project that I am undertaking through Rhodes University under the supervision of Professor Heila Lotz-Sisitka.

If you agree to take part in the review, your name will not be used in the Funder's Report or the PhD research. The names of any of your learners whose work is referred to, will not be used either.

We would like to use some photographs from the review in the Funder's Report and the PhD research. We will make sure that none of these photographs put any participants in a bad light. If there is any doubt, we will seek your permission.

I kindly request your consent to take part in this review by signing the statement below.

Thanks very much for your cooperation.

Regards

A handwritten signature in black ink, appearing to read 'Schudel', with a stylized flourish at the end.

Ingrid Schudel

Lecturer

RhodesUniversity Environmental Education and Sustainability Unit

Rhodes Department of Education

I _____ am prepared to participate in the evaluation and
research project of the 2008 Schools & Sustainability course.

Signature:

Date:

APPENDIX N(a): LETTER REQUESTING PERMISSION TO VISIT SCHOOLS

RHODES UNIVERSITY ENVIRONMENTAL EDUCATION AND SUSTAINABILITY UNIT

Rhodes University Department of Education, PO Box 94, Grahamstown, 6140
Tel: +27 (0)46-6038389 • Fax: +27 (0)46-6361495 • E-mail: i.schudel@ru.ac.za

20 June 2008

Dear Principal

RE: REQUESTING PERMISSION TO VISIT YOUR SCHOOL

As you are aware, one of the teachers from your school is participating in the Rhodes/WESSA *Schools and Sustainability Course*.

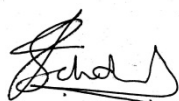
As part of the course we have a strong interest in establishing teachers' needs and contexts in which they work in order to improve the development and delivery of teacher professional development programmes and also to showcase the programme to current and future funders.

I would like to request permission to visit your school in order to gather information to further this cause. Such a visit would include visits to any environmentally-linked projects or challenges you would like to show us, an observation of a maximum of 3 environmental lessons presented in your school by the Schools and Sustainability teacher, and informal discussions with any teachers or learners that would like to talk to us about your environmental learning programme.

Data collected for the review will be used for two purposes 1) to compile an evaluation report for the funder and 2) to undertake an analysis of aspects of the learning interactions in and through the course. This will be towards a PhD project that I am undertaking through Rhodes University under the supervision of Professor Heila Lotz-Sisitka.

Thank you for your understanding and should you be willing to open your school to our visits, I look forward to meeting you.

Yours faithfully



Ingrid Schudel
Lecturer

APPENDIX N(b): LETTER REQUESTING PERMISSION TO USE NAMES AND PHOTOGRAPHS OF SCHOOLS



Rhodes University Environmental Learning Research Centre
PO Box 34, Grahamstown, 6140 • Tel: 049-903 8389 • Fax: 049-622 8028 • E-mail: lj.schudel@ru.ac.za

25 November 2012

Dear Ms Vimbi

RE: PERMISSION TO USE NAMES AND PHOTOGRAPHS IN THESIS

This is a letter to once-again thank you for your participation in the evaluation of the 2008 Schools & Sustainability course and permission to use your work in my PhD thesis.

It is now five years since I collected the data and I am finally reaching the conclusion of my thesis. You and your principal have given me permission to use your name, the name of your school and photographs of yourself as well as participating learners in the course evaluation report; but now I would like to request the same permission for my thesis.

Your work has provided such rich and detailed evidence of the successes and struggles of a school teacher in establishing environmental learning processes in schools, and I would like to acknowledge your very inspiring work as well as your genuine struggles in providing the very best opportunities for your learners.

The thesis will be made available on the Rhodes University website and in the library and data from the thesis may also be presented in conferences, seminars and other academic publications.

I am confident that all references to the work and context of the school have been made with the utmost integrity and attempt to represent the truth as accurately as possible. If you agree to your name, the name of your school, and associated photographs being made public in my thesis, then please indicate on the attached request form enclosed. If not, then please note this and I will a) provide an anonymous teacher/school name, b) blank out photographs that identify you, learners or members of the school and/or community.

I hope that we will meet again in the near future for a sharing of ideas and progress since the Schools and Sustainability Course!

Yours faithfully

Ingrid Schudel
Lecturer
Rhodes University Environmental Education and Sustainability Unit
Rhodes Department of Education

environmental
LIVING RESEARCH CENTRE

FORM: PERMISSION FOR USE OF NAMES AND PHOTOGRAPHS

I, Nokhanyo Vimbi, and _____ (school principal) give our consent for the use of the following in the PhD thesis of Ingrid Schudel:

Permission to	YES	NO
Nokhanyo Vimbi's name		
The name of the school		
Photographs of the school and classroom		
Photographs of Nokhanyo Vimbi		
Photographs of learners in the classroom		

Signed:

Nokhanyo Vimbi

School Principal

Please fax this form:
ATTENTION: Ingrid Schudel
FAX: 046-622 8028
OR Tel: 084 522 6644 to make alternative arrangements

Thank you for your co-operation!

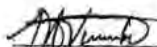


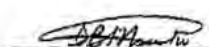
FORM: PERMISSION FOR USE OF NAMES AND PHOTOGRAPHS

I, Nokhanyo Vimbi, and D.B. Muntu (school principal) give our consent for the use of the following in the PhD thesis of Ingrid Schudel:

Permission to	YES	NO
Nokhanyo Vimbi's name	☒	☐
The name of the school	☒	☐
Photographs of the school and classroom	☒	☐
Photographs of Nokhanyo Vimbi	☒	☐
Photographs of learners in the classroom	☒	☐

Signed:


Nokhanyo Vimbi


School Principal

Please fax this form:
ATTENTION: Ingrid Schudel
FAX: 046-622 8028
OR Tel: 084 522 6644 to make alternative arrangements

Thank you for your co-operation!

environmental
LEARNING RESEARCH CENTRE

Schools & Sustainability

Rhodes University Department of Education



A Teacher Professional Development Course

Working through the curriculum towards a healthy school environment

Learning Unit 1

Environmental learning in the curriculum and local context



PROVINCE OF THE EASTERN CAPE
DEPARTMENT OF EDUCATION



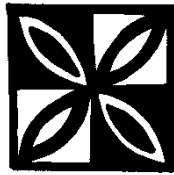
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Introduction

In this learning unit we will work with the National Curriculum Statement (NCS) to identify opportunities for environmental learning within the curriculum and within the school context.

We will start by examining the socio-ecological principle of the NCS and the purpose, features and scope of the Learning Areas to see how environment is integrated within the curriculum statements. We will ‘unpack’ some of the Learning Outcomes and the Assessment Standards, to deepen our understanding of them. We will then examine how your school environmental programme (e.g. 4H programme) integrates with curriculum purpose.

You will examine one aspect of your environmental context and analyse what information is available and what is needed to help you and your learners to make informed decisions for a healthier environment. To support this you will be introduced to different Learning and Teaching Support (LTSMs) Materials which you can draw on and expand as you see the need.

Your key challenge in this Learning Unit will be to focus on how you and your learners can find, work with and present information regarding your socio-ecological context . You will need to present evidence of this through a lesson plan (including selected LTSMs) and evidence of learners’ work.

In the next Learning Unit we will build on the work covered in Learning Unit 1 and look at hands-on enquiries that give more detailed understandings of the environmental challenges that you face in your local context.

Assessment

Your portfolio will be assessed after the completion of Learning Unit 1, based on the EVIDENCE you provide of having achieved the learning outcomes. The following learning outcomes will be used to guide the assessment of your Rhodes certificate:

You are able to ...

- Identify opportunities for environmental learning within the NCS and in your Learning Area(s)
- Identify appropriate LO's and AS's for your Grade, Learning Area and chosen environmental topic
- Gather information relevant to an aspect of your socio-ecological context
- Develop a lesson plan to support learners to find, use and present information
- Collect evidence of, and reflect on, your learners' work

Environment in the Curriculum

Environmental Education has come a long way in the past decade. Environment has historically been seen as something external to the curriculum, something (a specialised topic) that can be added onto other lessons to make them more exciting or to improve environmental learning in an *ad hoc* way. Often this education did not even take place at school but the learners would be taken on a trip to a nature reserve or a natural ecosystem somewhere and the learners would learn in or about “environment” for that day. Another common, but narrow approach to environmental education was the “campaign”, e.g. litter campaigns and clean-up campaigns, in which learners were required to act on a teacher’s wishes to address a problem or improve the environment. Often, their efforts were not self-motivated, but simply an act of following instructions. The value and ethics of such campaign-type approaches have been questioned. Very few teachers were able to integrate these *ad hoc* environmental learning activities with their classroom teaching in the school curriculum. This is partly because the curriculum they were working with did not inherently contain

opportunities for environmental learning. Where it did occur, it was treated as content within a subject such as biology or geography.

Fortunately, much has changed in the curriculum over the past ten years. In the NCS, environment and opportunities for environmental learning have been consciously designed and built into the curriculum in an integrated way. This means that opportunities for environmental learning can be found in all the learning areas and in many of the learning outcomes and assessment standards. This means that instead of planning environmental learning and then later trying to fit it in with the curriculum, teachers now have opportunities for developing environmental learning that emerges from the curriculum in a generative way.

Socio-ecological principle of the NCS

The National Curriculum Statement is guided by the goals set out in the South African constitution. It aims to develop the full potential of each learner as a citizen of a democratic South Africa through the five principles that underlie the NCS. The principles encompass the educational and social goals contributing to educational transformation and as such they need to inform all facets of the work of the teacher (DoE, 2003).

The first principle emphasises the socio-ecological aspects of environment:

- A recognition of the interrelationship between social justice, a healthy environment, human rights and inclusivity

This principle is prioritised by the DoE because of the injustices of our past. Social justice means that the needs of all the citizens of this country should be met and that all should have equal opportunities to improve their lives. The NCS creates awareness and sensitivity to issues of inequality, race, gender and disability, so that everybody can be treated with respect. Teachers should address the needs of all learners by designing appropriate learning programmes with different assessment activities.

As teachers we need to bear this principle in mind when developing lesson plans as well as in our everyday classroom practice. The principle should become a sensitising and strengthening focus within each learning area. We have seen that lesson plans that contribute to a healthy environment can also address issues of human rights and social justice.



ACTIVITY 1

Social justice, human rights, inclusivity and a healthy environment in South Africa today.

Read the story below. Use the space on the following page to explain how the people's rights to social justice, human rights, inclusivity and a healthy environment have been violated in this story.

Many South Africans live in conditions of under-development, because of an unjust political and economic history. Many women still collect firewood for fuel. A lack of alternatives may force them to use up the wood near their homes, and to go searching ever further. This makes them vulnerable to sexual assault. They may also resort to chopping down growing trees. This leads to deforestation (the loss of trees), which harms soil fertility, biodiversity and affects our life support systems. However, generating electricity for the nation also contributes to unhealthy environments. Coal power stations use huge quantities of water and create serious air pollution, which adds to the greenhouse effect and which also affects the health of those forced to breathe the air. The USA and South Africa contribute disproportionately to the production of greenhouse gases. These gases create global warming that is likely to affect the whole world, harming most seriously those people who have few alternatives, such as small island nations, fishers and small-scale farmers. If I teach this topic to a class which includes the children of Eskom employees, in such a way that they feel discriminated against, I have violated the principle of inclusivity in education.

(Adapted from Rosenberg, 2003. A Workbook for Developing Learning Programme Units with an Environmental Focus in Natural Sciences. National Environmental Education Project, Department of Education, Pretoria).

Your interpretation of the story

The story illustrates how issues of an unhealthy environment cannot be addressed in isolation from issues of social justice, human rights and inclusivity. Poorer South Africans are more likely to be directly dependent on natural resources to the detriment of their health and the health of the environment. Larger income earners also affect the environment, but do not necessarily experience the implications directly

themselves (for example electricity users do not feel the impact of the pollution on the Highveld). It is often the poor and marginalised who are affected most strongly by environmental pollution (for example workers in factories or settlements located close to industrial areas or waste sites). This raises concern for social justice and human rights in our country. It calls for inclusivity of all South Africans in contributing to decisions that affect their quality of life in the spirit of a true democracy.

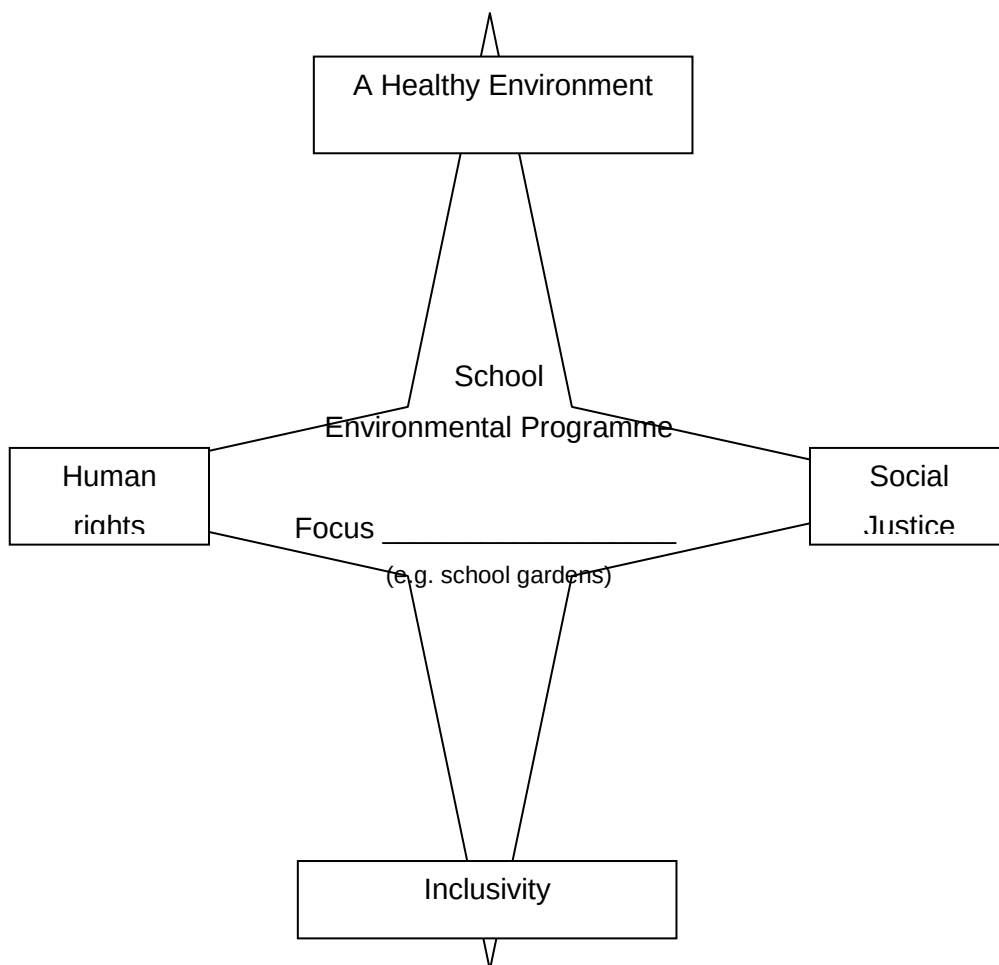


ACTIVITY 2

Unpacking your current school environmental programme in relation to the first principle of social justice, human rights, inclusivity and a healthy environment.

Complete the mind map on the following page illustrating what you understand by the meaning of social justice, human rights, inclusivity and a healthy environment in the context of your school environmental programme.

This activity is intended to give you an understanding of how your school environmental programme contributes towards the healing of divisions in South Africa. The first principle highlights the need for our education system to improve the quality of life of all citizens, free the potential of each person, and lay the foundations for a democratic and open society (Constitution of the Republic of South Africa, 1996, Act No 108).



Examples of hands-on enquiries and actions

There are many possible issues that you could investigate within your school environmental programme. A few of these are listed below to illustrate examples of hands-on enquiries and actions that could be developed around each.

Issue: Soil quality:

Hands-on enquiry

- Finding out the quality of soil in different parts of the school/community
- Mapping the incidence of soil erosion in your school/community
- Recording growth and health of plants in different soil types

Action

- Make compost to improve soil
- Start a wormery to improve soil
- Use the deep trench method to improve plant growth
- Grow and make organic fertilisers from herbs such as comfrey
- Plant trees and establish gabions/use old tyres to reduce soil erosion

Issue: Health and Nutrition:

Hands-on enquiry

- Investigating what foods people eat and how often
- Investigating what indigenous foods contribute to people's diets

- Do a scientific study of the *imifino* (wild vegetables) that germinate from cow dung

Action

- Start a campaign to have healthier snacks sold at the school gates.
- Encourage the growth of wild vegetables in the school garden
- Make a recipe book of food and medicinal recipes using indigenous plants from the area

Issue: Biodiversity loss and ecosystem health

Hands-on

Enquiry

- Do a scientific quadrant study of the incidence of a certain species or of biodiversity in an area
- Investigate the effect of pesticides on biodiversity in the home and garden
- Interview local community on uses of indigenous plants and changing practices with regard to harvesting and use.

Action

- Prepare and use alternative pest control methods
- Propagate indigenous plants
- Restore natural ecosystems to bring back indigenous fauna and flora

Issue: Water use

Hands-on enquiry

- Measure how much water is used and wasted in the school
- Make a rain gauge and measure rainfall and extrapolate as to how much

water could be collected over the year in a rain tank

Action

- Raise funds for a rain tank in the school
- Design water saving devices for the school garden and elsewhere
- Start a water-saving campaign in the school