

Understanding workplace-based learning contexts
to inform curriculum development:

The case of a Level 5 Environmental Education, Training and
Development Practices Qualification

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Abstract

This is an interpretive case study that explores the workplace epistemologies and institutional structures of two nested cases within the broader context of the Environmental Education, Training and Development Practices – Level 5 qualification (EETDP qualification) that is registered on the South African National Qualifications Framework. The study provides insights to inform EETDP curriculum development that is enabling of reflexive environmental education and training processes. The study develops an understanding of workplace epistemologies related to environment and education, the structural factors that enable and constrain agency of environmental educators and the role of reflexivity in practice and in education in two nested cases: the agricultural and local government sectors. It draws on findings from workshops, semi-structured interviews and document analysis of education materials in these two nested cases.

The study notes that there are diverse and seemingly ambiguous understandings of both environment/sustainability and education processes in the two nested cases. This ambiguity seems to relate to environmental education practitioners drawing on different forms of knowledge, including differentiated or theoretical knowledge, and 'common-sense' ways of knowing, in their education practice. The understandings related to theoretical knowledge are, in both nested cases, dominated by scientific or technical understandings where environment is understood in the terms of the natural sciences and education is seen in instrumentalist terms as the transfer of mainly technical environmental knowledge to learners in order to effect behaviour change. The study opens up deeper understandings of the epistemological, socio-cultural and structural features of context, in the two nested cases, that have a bearing on environmental educators. It provides insights into workplace structures that can be both enabling and constraining of agency and notes that the causal power of structures to enable or constrain does not lie only in the structures but also in relation to the intentionality of the environmental education practitioners/agents. The study then examines reflexivity as one of the means through which environmental educators in the nested cases are able to consider appropriate actions or responses to structural constraints or enablements.

Based on the insights offered by the research findings, the study makes recommendations for the EETDP curriculum development. It frames these recommendations within an understanding of curriculum as a contextualised social process that involves structural aspects of curriculum such as materials, as well as socio-cultural processes such as learning on the course and in the workplace.

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Chapter 1 Introduction

1.1 Introduction

In this chapter, I introduce the context of the research. To describe the context of this research I start with a discussion on the South African National Qualifications Framework (NQF) and the NQF Level 5 National Certificate: Environmental Education, Training and Development Practice (summarised throughout this study as 'the EETDP qualification'), which forms the focus of this study. I introduce the organisation that I work for, the Wildlife and Environment Society of South Africa (WESSA), and the work I have been doing on the EETDP qualification over the past two years. This discussion leads into a description of the research question. I also provide a brief overview of the study as a way of mapping out the study for the reader.

1.2 The NQF and the EETDP qualification

The South African Qualifications Authority Act (1995) resulted in the establishment of a National Qualifications Framework that is outcomes-based (Lotz-Sisitka, 2005; Burger, 2004). One of the intentions of the NQF is to integrate education and training and to address skills shortages in order to strengthen economic growth (Ensor, 2003). The NQF also aims to facilitate access to education and training and to redress past unfair discrimination in education towards a more egalitarian education system (Allais, 2003).

An occupationally-directed stream of education and training on the NQF has been developed to cater for workplace-based learning with 25 Sector Education and Training Authorities (SETAs) established to drive the generation of qualifications and unit standards for their sectors. The SETAs also provide education and training quality assurance (ETQA) functions such as the accreditation and quality management of education and training providers (Burger, 2004). The Department of Labour, through the South African Qualifications Authority (SAQA), has introduced learnerships as a means of providing workplace-based education and training. The rationale behind this is clearly described in a 1995 White Paper on Education and Training that states an integrated approach [to education] implies a view of learning which rejects a rigid division between 'academic' and 'applied', 'theory' and 'practice', 'knowledge' and 'skills', 'head' and 'hand' (Department of Education, 1995). Underlying this view is an assumption that all knowledge forms are commensurable (Ensor, 2004). The commensurability of these knowledge forms is meant to be embedded in the way that

NQF qualifications are structured. These qualifications are, for the most part, made up of unit standards that are generic statements of what a learner should be able to do on completion of the learning. Content and context are not 'prescribed' (although some guidance is provided) in the qualifications framework and these aspects of curriculum design are left to the training provider, creating a complex and culturally contingent epistemological framework for NQF-based education and training.

The environmental education standards generating body (SGB) has written a number of environmental education qualifications (including the EETDP qualification) that have been registered and are now available on the NQF. I have chosen to focus my research on the EETDP qualification because in my work, I am part of a team that is developing a curriculum framework and writing learning support materials for the EETDP qualification. In this work, I have come across a number of challenges that have led to the research interests that are described in this section.

The purpose of the EETDP qualification is well described in SAQA's (2005:1-2) introduction to the qualification:

The National Certificate in Environmental Education, Training and Development Practice (EETDP) (NQF Level 5) will prepare candidates to function as entry-level environmental education practitioners. It will apply in particular to part-time practitioners working in environmental education centres and to people who may be employed primarily in fields other than education, but who may develop an environmental education role in their workplace, e.g. field rangers, outreach officers, interpretive officers, etc.

People qualified with the National Certificate in EETDP (NQF Level 5) will be able to select and adapt existing environmental learning programmes, and justify their choices in terms of principles of environmental education and in response to issues of environmental justice and sustainability. When qualified, they will be able to plan, organise, implement and review a limited selection of environmental learning events using an active learning approach. They will also be able to select, adapt and use learning support materials to enrich the learning experience.

Given regular supervision in a structured environment, people qualified at this level will be able to make a meaningful contribution to environmental change through education. They will be able to work with others to undertake environmental action projects or facilitate environmental learning programmes. They will be able to work in a variety of contexts and workplaces, including environmental education centres, cultural and natural heritage sites (e.g. nature reserves, protected areas, museums, botanical and zoological gardens), and community and industrial settings. They may also be able to function as teachers' aides in formal education settings in, for example, assisting in field trips.

Looking at the purpose of the EETDP qualification, it is clear that it is aimed at developing both the *educational* and *environmental* competence¹ of the learners. Further, the qualification has been developed for environmental education and training practitioners in a diversity of contexts.

1.3 Learnerships

In late 2003 I worked within an informal partnership with a group of stakeholders interested in the implementation of the EETDP qualification. One of our aims was to have this qualification registered as a learnership. A learnership is a particular way of offering a full qualification and is registered with the Department of Labour by the relevant SETA. Learnerships are usually only based on qualifications that address priority skills areas for that particular sector. These priority skills are identified in a SETA's Sector Skills Plan (SSP) that is based on a combination of research and the workplace skills plans of a SETA's constituent employer base. Once a qualification is registered as a learnership, an employer organisation can request for employees (already employed) or unemployed/part time staff (employed only for the duration of the learnership) to be placed on the learnership. The employer can specify an accredited provider to provide the education and training component of the learnership. In certain cases a SETA will select a provider and specify the number of learners for a learnership. A learnership always involves:

- a learner,
- an employer,
- an accredited education and training provider, and
- the relevant SETA.

Funding for learnerships is in excess of the usual claim that an employer can make from its Skills Development Levy (SDL) contributions for accredited education and training of employees. In the case of learnerships, additional funding is made both for the training provider and to pay a basic stipend or living allowance for unemployed learners.

From an educational point of view, learnerships are designed for most of the learning to be workplace-based, with additional learning taking place through contact education/training workshops delivered by an

¹ In this study, the meaning of competence intended is that described by SAQA as applied competence (Initiative for Participatory Development, 1998). This is a combination of practical competence (a demonstrated ability to perform a set of tasks), foundational competence (a demonstrated understanding of what one is doing and why) and reflexive competence (a demonstrated ability to connect what is known with what is done so that learners can adapt to new or unexpected situations). A critique of this view of reflexive competence is given in section 2.7.

accredited education and training provider. The workplace learning is supported through carefully designed learning activities that draw on and enhance the work experience as well as mentoring by more experienced colleagues in the workplace.

There are two main reasons for wanting to have the EETDP qualification registered as a learnership. Firstly, many of the potential learners are either fully or part-time employed and the format of a learnership, with its emphasis on workplace-based learning is well suited to such candidates who would otherwise have to leave work for a year to complete a similar qualification. One of the purposes of the qualification, that learners contribute to environmental change through education, is also far more likely to be achieved if the learner is working and learning in a structured workplace or community setting.

A second consideration is the funding implications. The fact that learnerships are funded by the Department of Labour, through the Skills Development Levy, means that access to the learnership is enhanced. This is particularly so for unemployed or part-time employees and small civil society organisations who would otherwise struggle to find funding for professional development.

The focus on workplace learning in learnerships is one of the reasons for undertaking this research into workplace epistemologies. The focus in the EETDP qualification on developing both environmental and educational knowledge and skills led to an interest in this study on how environment and education are understood by education practitioners, how they have been come to be understood this way and whether there are different understandings in the two sectors that are examined in this study. It is hoped that this research will provide some insights² that will inform the curriculum development process for the EETDP qualification³. In the next section I describe the research and participatory curriculum development work that I have contributed to, with a range of other stakeholders, for the EETDP qualification.

² I wish to indicate here that this study only presents a tentative ‘first step’ in researching this arena. I acknowledge that the potential scope of such a study is enormous, and for the purposes of a half thesis, I have had to limit the scope of the study in various ways. With further research, broader data generation processes and more in-depth theoretical work, this study can be taken further and more in-depth insights into the research question can be gained.

³ As will be discussed later in the study, the scope of the EETDP curriculum is broader than the two sectors investigated in this study. It is also the first time that this curriculum is being developed, this study therefore represents ‘early steps’ in a potential longer term of reflexive curriculum development work informing the EETDP qualification.

1.4 The Environmental Learning Forum

WESSA is one of the partners in the informal partnership, mentioned above, that has conducted a needs analysis and a participatory curriculum development process for the EETDP qualification over the past two years. The other key organisations that have contributed to these processes include the Rhodes University Environmental Education and Sustainability Unit (Rhodes EESU), the Department of Environment Affairs and Tourism (DEAT) and the Environmental Justice Networking Forum (EJNF). When we first contacted the Education, Training and Development Practices SETA (ETDP SETA) with the aim of registering the EETDP qualification as a learnership, we were advised that we would need to conduct a needs analysis in order to prove the need for such a learnership and the skills that it would develop.

During 2004 and 2005, a range of research and participatory curriculum deliberation activities were undertaken by this group of organisations including:

- A review of five key SETAs' Sector Skills Plans (this included the ETDP SETA, the Local Government SETA, the Chemical Industries SETA, the Primary Agriculture SETA and the Tourism and Hospitality SETA) to determine what, if any, environmental skills needs were being identified and planned for within the five sectors. This research was commissioned by DEAT and conducted by the Rhodes EESU with its main findings being that environmental skills were largely neglected and where they were identified, the concept of environment was often very narrowly defined as related to biophysical issues or else to refer to the general surroundings or working environment (Malema & Lotz-Sisitka, 2004).
- A recommendation from the above research was that a more detailed analysis of selected environmental legislation be conducted to determine the environmental knowledge and skills required to implement South Africa's environmental policies and legislation. This research was needed to inform the various SETAs for a more careful consideration and inclusion of environmental skills in their SSPs. This was again commissioned by DEAT and conducted by the Rhodes EESU. The resulting document is a detailed analysis of key environmental legislation and an outline of a strategy that DEAT could apply to enable a more coordinated and comprehensive approach to accredited environmental skills development in South Africa (Olvitt, Malema & Lotz-Sisitka, 2004). This research articulated the need for practical, foundational and reflexive competence in implementing South Africa's environmental legislation.

- With funding from the World Wildlife Fund – South Africa (WWF-SA) and DEAT, WESSA led a number of curriculum planning workshops and surveys throughout 2004 for environmental education stakeholders from a diversity of sectors including agriculture, conservation, industry and local and provincial government. The workshops gathered feedback from stakeholders regarding their environmental education and training needs with a focus on identifying the differing needs in these different sectors or contexts. A brief contextual profile of each of these sectors was also researched and these reflect historical factors, legislation and contemporary environmental issues and risks that would need to be considered in the curriculum design for the EETDP qualification (Wigley & Olvitt, 2005). This research was written up as a needs analysis document that was then submitted to the ETDP SETA in early 2005.

Based on the above research, the ETDP SETA submitted an application to the Department of Labour to have the EETDP qualification registered as a learnership and this took place in February 2005. Throughout this work, and as we interacted with a diversity of organisations and individuals, it became apparent that there was a lack of accredited education and training providers offering environmentally related courses in general. We felt that the complexity and layers of bureaucracy surrounding the NQF and accreditation process was partly to blame, thus preventing most environmental organisations from even attempting to navigate their way into the NQF and work with accredited courses, both for their own staff development purposes and to become accredited to offer accredited courses to others.

At the same time there was an increasing level of interest in accredited environmental courses such as the EETDP and many of the organisations we were working with expressed their interest in getting involved in some way or another. It was at this point that we decided that the best way to open up possibilities for others to participate in the work we were doing was to formalize our informal partnership/network and so the Environmental Learning Forum (ELF) was formed (the ELF website can be accessed at www.envirolearningforum.co.za). At an EETDP curriculum planning meeting in April 2005 the ELF officially launched with about ten organisations present. Since the launch, there has been an ongoing interest from the environmental education community and the membership now stands at about 20 member organisations and individuals.

The aims of ELF (taken from the ELF founding document, 2005) are to:

- Provide a meeting place for accredited education and training providers, emerging providers, employers, individual consultants and civil society to form partnerships to be able to respond to

environment and sustainability related education and training opportunities arising out of the NQF such as skills programmes and learnerships.

- Provide support to emerging providers for the accreditation process.
- Provide a supportive community of environmental education and training practitioners committed to excellence and collaboration around non-accredited courses such as in-house staff development or programmes with schools or the general public.
- Develop a protocol for members based on an ethic of collaboration, sharing and mutual support and a commitment to developing and implementing locally relevant and contextualised environmental learning programmes.
- Provide a forum for the sharing of experiences, lessons learnt, case studies and learning materials between its members.
- Seek to influence policy and delivery related to environment and sustainability education and training by interacting with the relevant government departments and Sector Education and Training Authorities to ensure environment and sustainability issues are attended to.

The challenges that have faced us in the above work, particularly around the possibilities for engagement with the new institutional frameworks of SAQA and the NQF and the opportunities they present for workplace-based environmental education and training, was one of the factors leading towards the interest, in this study, in the institutional structures that can both constrain and enable change towards environmental sustainability. In the study, this interest is also focused on the structures within individual organisations. The research on the SSPs conducted by the Rhodes EESU was also influential in framing an interest in epistemologies around environment and education in the two sectors that are studied here. I will now introduce the research question and goals of the research.

1.5 Research aim and goals

The aim of this research is to develop an understanding of workplace epistemologies and institutional structures in order to inform curriculum development that is enabling of reflexive environmental education and training processes in the context of the EETDP qualification. I have used an interpretive case study approach (see section 3.2.1 & 3.2.2) with the following goals:

- To develop an understanding of the workplace contexts of environmental education and training practitioners in two sectors: agriculture and local government;

- To probe the workplace epistemologies around environment and education, including current theories of knowledge, current ways of knowing and how knowledge has been and is created, in these two sectors.
- To consider the institutional structures in these two sectors and how these may influence agency and possibilities for action and change through environmental education.

These goals have been formulated with a view to identifying issues that need to be considered in curriculum development that is enabling of reflexive learning processes in these two workplace learning contexts for the EETDP qualification. The focus in this study on epistemology, structure and reflexivity is further explained in sections 2.5, 2.6 and 2.7.

1.6 Overview of the study

Chapter two is an overview and discussion of the literature relevant to this study. A contextual profile of the agricultural and local government sectors is presented. These profiles are brief discursive overviews of historical factors that have shaped these sectors, key environmental issues and risks and social structures, including environmental legislation and policy, that have a bearing on environmental educators working in these sectors. A profile of potential learners for the EETDP qualification is given for each sector. Finally, a discussion on each of the key interest areas of the study is given by drawing on the literature and theory relating to professional development in environmental education in South Africa and the NQF, workplace learning, epistemology related to environment and education, structure and agency and reflexivity. This chapter provides the theoretical foundation that is drawn on again in the discussion of the research findings in chapters five and six.

In chapter three I provide a description of the methodology and research design decisions. I introduce the research orientation and approach to the study and describe the methods used to generate and analyse the data. Finally, I explain how I have dealt with validity, trustworthiness and ethics in the study.

Chapter four is a presentation of the data. I present the data as a narrative that takes the reader through the two nested cases of agriculture and local government within the broader context of the EETDP qualification. The conceptual framework is provided by *a priori* categories that were developed out of the research question and further elaborated into analytical sub-categories that emerged from the data in what is termed a guided analysis. In this chapter, I have provided many direct quotes from the raw data in a thick

description that allows the reader to draw their own conclusions from the data with minimal discussion and interpretation of the data.

Chapter five is a discussion of the research findings. I have condensed the data into analytical statements that serve as a focus for the discussion that relates back to the literature review presented in chapter two and also draws on further literature to support my arguments. As I explain in chapter three, this study is not aimed at causal explanations and so the discussion aims to deepen the understanding of the two nested cases in order to make recommendations for the development of the curriculum for the EETDP qualification.

In chapter six I present concluding recommendations that draw on the discussion in chapter five. I also provide a reflexive review of the methodology and make recommendations for further research. Finally, I provide a summary or brief overview of the study.

Chapter 2 Context of the study

2.1 Introduction

In this chapter I present a discussion of the key elements of the study. I start with a contextual profile of the agriculture and local government sectors that outlines the historical influences on these sectors, current environmental issues and risks, related environmental legislation and finally gives an overview of potential workplace contexts and learner profiles for the EETDP qualification in these sectors. I then provide a discussion on workplace learning and an overview of professional development in environmental education in South Africa and the NQF. Finally, I discuss the three core interests of the study: epistemology; structure and agency; and reflexivity. This discussion presents theoretical vantage points / theoretical lenses for the study, which are later used to interpret and discuss the data with more depth. These theoretical vantage points have also been used to guide the data generation and analysis, to enable me to address the research question with more focus and depth.

2.2 Contextual profile of the agricultural and local government contexts

In this section, a brief contextual profile of the agricultural and local government sectors is given. The profile starts with a short historical overview of some of the key events and processes that have shaped the sector in question and then, for brevity, some of the key environment and sustainability issues and risks and relevant environmental legislation and policy are given in table format for the two sectors, followed by examples of potential learners for the EETDP qualification in each sector. The contextual profiles are not comprehensive and merely provide a broad-based discursive overview of each sector. Their purpose is to provide insights into some of the factors that may need to be considered in the development of the EETDP curriculum. Through a process of progressive focussing throughout this study, further depth of insight into these two contexts is provided, within the limited scope of this study (see chapters 3, 4 & 5).

2.2.1 Agricultural contexts

2.2.1.1 An historical perspective

The agricultural landscape in South Africa has been shaped by a myriad of processes and events in the past. This brief look into historical influences explores the socio-ecological, economic and political contexts of these influences.

Pre-colonial agricultural activities played a key role in shaping the socio-economic and political structures of early southern African communities. In terms of the agricultural practices of pre-colonial farmers, much bad press has been given to their methods of farming. Bundy (1988) challenges these general views and proposes that the methods and practices of black farmers were in fact a very effective way of farming informed by a deep understanding of the natural environment and its limitations (including biophysical limitations, such as climate and soil, and social limitations, such as available technology). For example, early settlers and missionaries who visited Pondoland, the northern coastal area of the former Transkei, were amazed at the productivity of the Mpondos' agricultural activities. Beinart (1980:125) quotes an unnamed missionary in the mid-1830's: 'In general it may be said of Emampondweni, "the valleys also are covered with corn; they shout for joy, they also sing"'.

A question arises as to how, in the periods of early European settlers, the Great Trek and the Mfecane, the majority of South Africa's people moved from their successful pastoral-cultivator way of life to their current status of 'sub-subsistence rural dwellers, manifestly unable to support themselves by agriculture and dependent for survival upon wages earned in "white" industrial areas or upon "white" farms' (Bundy, 1988:1). This change can be partially explained by the fact that, towards the end of the nineteenth century, the cultivation of crops and the economy that arose around the surplus production shifted towards meeting the demands of an outside market (Marks and Atmore, 1980). Whereas most economic activity had been communal, now 'production became atomised to the level of the homestead' (Marks and Atmore, 1980:17). As individual homesteads became more independent and were able to access outside resources through trade, the authority of the chiefs was slowly undermined and eventually led to the emergence of the peasant household (Marks and Atmore, 1980). Bundy (1988) and Palmer and Parsons (1977) explore in detail the process where capitalist development first stimulated the growth of a peasantry by providing the demand for foodstuffs and cash crops and then helped undermine it through the search for vast quantities of cheap labour, especially after the mineral discoveries.

Apartheid has also had a huge impact on agriculture and land-use today with one of the most important factors being the denial of black South African's right to own land. The 1913 Natives Land Act, Group Areas Act, Population Registration Act and the Bantu Authorities Act are part of the legislation that underpinned apartheid and prevented black people from owning land (Cooper, 1988). Another key aspect of the apartheid era was the formation of the Bantustans. These areas set aside for black South Africans made up 13 percent of South Africa (Claassens, 1991).

The widespread social disruptions caused by forced removals and the forced concentration of the majority of the South African population into 13% of its land area has led to substantial ecological damage in the former Bantustans. Letsoalo (1991:102) refers to a 1939 government White Paper on land policy describing the 'reserves as congested, denuded, overstocked, eroded and for the most part in a deplorable condition.' With the degradation of the natural environment, it became more and more difficult for even subsistence needs to be met through agriculture (Letsoalo, 1991). Increasingly, black South Africans would be forced to seek work on white owned farms or the mines and growing industrial sector. This met the demands of the capitalist economy for a cheap labour force that grew rapidly with the mineral discoveries. The continued degradation of the Bantustans to the point where subsistence needs could not even be met, threatened the supply of migrant labour and the South African government realised the necessity of halting or reversing this underdevelopment (Letsoalo, 1991). The government then introduced its 'betterment schemes', based on the myth that the crisis was caused by bad farming practices of the black farmers in the Bantustans (Letsoalo, 1991).

These historical processes and events have shaped the way the agriculture sector is structured and perceived today. In this research I consider how this history has influenced the way that agriculture and environmental issues in the agricultural sector are understood by role-players in the agricultural sector.

2.2.1.2 Key environmental issues and risks and related social structures including environmental legislation and policy in the agricultural sector

A brief overview of some of the key environmental issues and risks, summarised from the EETDP Needs Analysis (Wigley & Olivitt, 2005), and relevant environmental legislation will be presented in table format for ease of reference. Following this a description of typical workplace contexts for the EETDP qualification in the agricultural sector is given.

Table 1.1 A brief outline of key environmental issues and risks in the agricultural sector and the social structures (including legislation and policy) related to these issues.

Environment and Sustainability Issues and Risks	Related Social Structures (including legislation and policy)
<p>Globalisation and neo-liberal economics</p> <p>Globalisation as a worldwide trend and neoliberalism as the major economic paradigm can be seen as environmental risks in the agricultural sector in the sense that the discourses around them shape our thinking and behaviour in ways that we are often not conscious of with many unknown or immeasurable effects. These effects include the majority of the environmental risks in the world today, including those facing the agricultural sector.</p> <p>The emerging risks and issues associated with globalisation and capitalism go back as far as the early days of colonialism in South Africa when the demands of capital for a large, cheap labour source resulted in the policies and legislation that forced the majority of black South Africans off their land and eroded not only their ability to produce excess agricultural produce for the open market but also their subsistence abilities.</p>	<p>Formal/Visible</p> <p>Shift in macro-economic policy in South Africa after 1996 from that based on principles and values of the Reconstruction and Development Programme (RDP) to that of Growth, Employment and Redistribution strategy (GEAR) that is shaped by neoliberal economics (Hart, 2002).</p> <p>The range of international legislation, policy and trade agreements governed by the World Trade Organisation (WTO).</p> <p>A key feature of the South African Agricultural Strategic Plan (DoA, 2001) is the development of commercial agriculture to compete in international markets.</p> <p>Informal/hidden</p> <p>Unquestioned acceptance of neoliberal capitalism as the only viable development route and belief in the ‘trickle-down effect’ to eradicate poverty and inequality.</p>
<p>Land Ownership</p> <p>By 2002, a total of 427 337 hectares of farm land had been redistributed to a total of 62 245 black households (Burger, 2003). The total agricultural land area in South Africa is about 96 million hectares. This foregrounds the land issue as one of the key issues that will influence the agricultural sector. In the ten years of transformation since 1994, a total land area comprising less than a half percent of total agricultural land area has been redistributed and this is certainly a cause for concern considering, for example, the land situation in the neighbouring country of Zimbabwe.</p>	<p>Formal/visible</p> <p>The Land Redistribution and Development programme (LRAD) of the department of Land Affairs.</p> <p>Private property rights</p> <p>Informal/hidden</p> <p>Historical/social/cultural value of land and associated dignity of land ownership</p> <p>Increasing urbanisation and aspiration to urban/modern lifestyle particularly among youth</p>

<p>Agricultural Subsidies</p> <p>On an international scale, the risks around agricultural subsidies include inequalities in the ability of richer nations to subsidise agriculture and the ability of poorer nations to do so. The huge subsidies given to farmers in Europe and North America help them to dominate the world food market. A more insidious result is that the real costs of capitalist agriculture are hidden and used to promote the idea that the only viable and sustainable way to feed the world's population is through the capitalisation of agriculture and an increase in biotechnology and inorganic farming practices.</p>	<p>Formal/visible</p> <p>Related policies of the WTO Latest world trade talks, e.g. Hong Kong 2005</p> <p>Informal/hidden</p> <p>Dominant technical/scientific epistemologies related to agricultural practice</p> <p>The nature and extent of global inequality</p>
<p>Capitalism and Technology</p> <p>Risks emerging from the increasing capitalisation of agriculture and the increasing role of big business include genetic modification and intellectual property rights and the reliance on high inputs of inorganic fertilizers, pesticides and herbicides.</p> <p>Despite the huge risks involved and the evidence that the volume of production is not the problem but rather the distribution of food, agribusiness continues to promote GMO and has succeeded in convincing many countries that the risks are known and negligible. GMO technology does not meet the precautionary principle in that it has not been conclusively and independently proven safe for humans, health and the environment (Earthlife Africa, 2002). Genetic contamination of natural species by GMO species is one of the key biophysical risks associated with GMO technology. Socially, GMO technology carries huge risks of disrupting the age-old tradition of farmers saving, adapting and exchanging seeds to promote biodiversity and food security (Earthlife Africa, 2002).</p>	<p>Formal/visible</p> <p>The Trade Related Intellectual Property Rights Agreement (TRIPS) of the WTO forces countries to introduce legislation that allows the patenting of life forms and indigenous knowledge (Shiva, 2001).</p> <p>South African legislation on genetically modified organisms (GMO)</p> <p>Informal/hidden</p> <p>Unquestioned belief in science and technology as solutions to problems like poverty/hunger</p> <p>Power relations and access to media and other forms of communication by multinational corporations to shape public opinion and access to information about technology e.g. GMO</p>

<p>Biophysical degradation</p> <p>There is a range of impacts that current farming methods have on the biophysical environment including, for example, overgrazing, soil erosion, desertification, loss of biodiversity, habitat/ecosystem destruction, pollution of soil and water systems through chemical pollution (fertilizers, pesticides, herbicides), etc.</p>	<p>Formal/visible</p> <p>Conservation of Agricultural Resources Act Various conservation/environmental legislation e.g. NEMA, Biodiversity Act.</p> <p>Informal/hidden</p> <p>Anthropocentric ethical orientations and assumptions/values towards nature and belief in human domination over nature through human control manipulation of nature through agricultural practices.</p>
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The overview in table 1.1 points to the multi-facetted and wide reaching environmental issues and risks facing the agricultural sector. A look at these issues shows that there is a complex interrelationship between various dimensions of each issue including biophysical, social, economical and political that are further complicated by historical factors. The right-hand column elaborates on the complex structural environment that has a bearing on environmental educators in relation to each issue or risk. The role of such structures and their bearing on the agency of environmental educators is discussed in section 2.6.

The agricultural sector is broad and diverse and includes, for example, poor subsistence farmers, emerging or small-scale commercial farmers and large corporate farmers. Across this spectrum is a range of practitioners who engage in extension or educational support to farmers. Examples of the workplace contexts of practitioners that might benefit from the EETDP qualification are now given.

2.2.1.3 Typical workplace contexts for the EETDP qualification in the agricultural sector

Environmental Education is not a well-established activity within mainstream agriculture, in particular the commercial farming sector (Wigley, 2004). Many NGO's and individuals have included an environmental component in training of rural and urban subsistence farmers and this usually takes place in the form of permaculture training or "sustainable farming" courses (*ibid*, 2004). All the provincial departments of agriculture employ agricultural extension officers whose job is to provide technical support and in-the-field training and support to both commercial and subsistence farmers. In KwaZulu-Natal and Mpumalanga, the provincial departments of agriculture are amalgamated with the provincial department of environment affairs and the role of the agricultural extension officers is also to consider environment and sustainability in agriculture, with the support of Environmental Officers in their departments. Due to the many environmental

issues and risks generated by agricultural activities, as discussed in the table above, there appears to be a need for a more comprehensive and well conceptualised approach to environmental education in the agricultural sector. The EETDP qualification could potentially play a role through the development of the environmental capacity and education skills of the following role-players in the agricultural sector (summarised from Wigley & Olvitt, 2005):

- Agricultural Extension Officers of the provincial agricultural departments,
- Field staff, assistant field staff and other community development workers involved in agricultural community development projects of government agencies and NGOs and CBOs,
- Unemployed community members involved in such projects who have an interest and capacity to develop into educators and trainers themselves and who could find employment with NGO's or other agencies after completing a qualification such as the EETDP Learnership.
- Relevant staff from commercial agricultural research, development and training institutes.
- Environmental Officers in the provincial departments of environmental affairs whose role is mainly law enforcement but who are increasingly playing an educational role too.

This discussion provides insights into the broader context in which the EETDP qualification will be offered in the agricultural sector. It also provides a background against which the data generated through a semi-structured interview with an agricultural extension officer (see section 3.2.2 and 3.4.2) can be analysed in context.

2.2.2 Local government contexts

2.2.2.1 An historical perspective

This section draws heavily on the historical overview of local governance produced in the needs analysis document produced to inform the development of the EETDP qualification (Wigley and Olvitt 2005: 45-48).

The Group Areas Act, a key piece of apartheid legislation, resulted in strict residential segregation and compulsory removal of black people to “own group” areas (RSA, 1998). Apartheid aimed to limit the extent

to which affluent white municipalities would bear the financial cost of servicing black areas through such spatial separation, influx control and a policy of "own management for own areas" (Wigley & Olvitt, 2005).

Various attempts were made under apartheid to introduce "own management" structures for black residents at the local level. This was in part to compensate for restricted rights, and in part to bolster the political and economic privileges of racial exclusion.

The following points summarise the historical overview:

- In Bantustans, limited local government was established
- Traditional leaders were given powers over land allocation and development matters in areas with communally owned land. Some small rural townships (the so-called "R293 towns") were given their own administrations, but these lacked real powers.
- In the 1960s, "Coloured" and "Indian" management committees were established as advisory bodies to white municipalities.
- The Bantu Affairs Administration Act of 1971 established appointed Administration Boards, which removed responsibility for townships from white municipalities.
- In 1977, Community Councils were introduced. Community Councils were elected bodies, but had no meaningful powers and few resources. They never gained political credibility.
- In 1982 Black Local Authorities replaced Community Councils. Black Local Authorities had no significant revenue base, and were seen as politically illegitimate from the start. They were rejected by popular (and sometimes violent) community mobilisation in the mid-1980s.

To some extent these forms of "own local government" acknowledged the permanent presence of black people in urban areas. However, they were designed to reinforce the policies of segregation and economic exclusion. There were never enough resources to make any real difference to the quality of life of their constituents.

Historically, most local government revenue in urban South Africa was self-generated, mainly through property taxes and the delivery of services to residents and business. This particularly suited white municipalities which had small populations to serve and large concentrations of economic resources to tax.

Financial shortfalls were built into local government for black areas. Apartheid regulations barred most retail and industrial developments in black areas. This limited the tax base and forced residents and retailers to spend most of their money in white areas. Municipalities in black areas were therefore deprived of the means to meet the needs of local residents.

In rural areas, discrimination and segregation were equally stark. Water and electricity were supplied to white residents in rural areas at enormous cost, while scant regard was given to the needs of the rural majority. Crisis and collapse were inevitable.

Communities began to mobilise against the apartheid local government system. At its launch in 1983, the United Democratic Front gave prominent attention to the Koornhof Bills which established the Black Local Authorities.

Black Local Authorities attempted to impose rent and service charges on township residents to increase revenue. This revenue source could never have provided for meaningful delivery. It only served to anger increasingly politicised communities. The rejection of Black Local Authorities in the mid-1980s led to a popular uprising which shook the foundations of the apartheid order.

Since 1994, the ANC government has introduced many changes to the institutional structure of government at all three levels: National, Provincial and Local government. The role of local governments has become more dynamic and is no longer merely one of service delivery; rather local governments have become key agents of economic development (Burger, 2004).

There are three categories of municipalities as outlined in the Municipal Structures Act (1998) and these are Metropolitan Municipalities, Local Municipalities and District Municipalities. The Municipal Demarcation Board determined that South Africa should have six metropolitan municipalities, namely Tshwane (Pretoria), Johannesburg, Ekurhuleni (East Rand), Ethekwini (Durban), Cape Town and Nelson Mandela (Port Elizabeth), 231 local municipalities and 47 district municipalities (Burger, 2004).

The demarcation of the local municipalities has led to a redress of the situation described above with former townships and other segregated areas now combined under one local municipality. National government has made a concerted effort to assist local municipalities with service delivery. National government has particularly supported redress approaches to address needs in formerly disadvantaged areas and some of the largest increases in the national government's budget were in transfers to the local sphere, rising by 26% a year from 2001/02 to 2004/05 from R6.6 billion to R13.2 billion (Burger, 2004).

A number of programmes have been established by national and provincial government to support local government, some of which include:

- The **Consolidated Municipal Infrastructure Programme (CMIP)** – this aims to provide basic levels of service to improve the quality of life of ordinary people and enhances the developmental impact of

the delivery process by focusing on the transfer of skills and promotion of small, medium and micro-enterprises using labour-intensive construction processes and maximising job-creation opportunities.

- **Municipal Infrastructure Investment Unit (MIIU)** – this is a non-profit company created in 1998 to help municipalities find innovative solutions to critical problems in the financing and management of essential municipal services, for example municipal-service contracts, build-operate-transfer agreements, management contracts and other partnerships with public and private entities.
- **Municipal Systems Improvement Programme** – this provides direct assistance to municipalities for capacity-building and for implementing new systems required by local government legislation, for example to assist with the preparation of integrated development plans (IDPs).
- **Municipal Infrastructure Grant (MIG)** – this is a medium-term plan currently in the pipeline to rationalise infrastructure transfers to local government and will be phased in over the next few years. The MIG will be created through a merger of the CMIP, the Local Economic Development (LED) fund, the Water Services Project, the Community-Based Public Works Programme (CBPWP) and the Municipal Sports and Recreation Programme (MSRP).
- **Local Economic Development (LED) and Poverty Alleviation** – LED programmes create employment and economic growth with the aim of alleviating poverty through municipality-led initiatives and projects and is a way of linking with other household, social and economic-infrastructure programmes.
- **Integrated Development Plans (IDPs)** – these aim to promote integration of municipal activities by balancing social, economic and ecological pillars of sustainability. (From: Burger, 2004: p. 351-352)

As with the agricultural sector, this history of the local government sector is presented here because it is part of the context of the study. The data generated for this study and the analysis of the data cannot meaningfully take place without considering the historical context and influences that have shaped the local government sector.

2.2.2.2 Key environmental issues and risks and related social structures including environmental legislation and policy in the local government sector

The list of environmental issues and risks described in the table below are those identified by respondents to a survey conducted as part of an environmental education and training needs analysis (Wigley & Olvitt, 2005) for the EETDP Qualification.

Table 1.2 A brief outline of key environmental issues and risks in the local government sector and the social structures (including legislation & policy) related to these issues.

Environment and Sustainability Issues and Risks	Related Social Structures (including legislation and policy)
<p>Waste management</p> <p>Current practice mainly involves collection and dumping, more sustainable approaches to waste management are needed e.g. recycling.</p>	<p>Formal/visible</p> <p>National Environmental Management Act (NEMA)</p> <p>Municipal legislation (e.g. IDP, Municipal Systems Act)</p> <p>Department of Water Affairs and Forestry (DWAF) related legislation on landfills.</p> <p>Informal/hidden</p> <p>Separate departments/disciplines in local government e.g. waste management department may be separate to environmental management department.</p> <p>Habit and lack of consideration of alternatives</p>
<p>Land use planning and management</p> <p>Sustainable land use planning should be included in IDPs and municipalities should be more aware of the implications of lack of environmental planning around land use practices and planning, for example, destruction of critical ecosystems.</p>	<p>Formal/visible</p> <p>IDPs, NEMA, Municipal Systems Act, Biodiversity Act</p> <p>Informal/hidden</p> <p>Engineers/planners planning a development such as road infrastructure or housing development may not consider environmental factors due to their specific focus on their own discipline.</p>
<p>Biodiversity loss</p> <p>Negative impacts of development of urban areas on biodiversity including degradation of ecosystems, production of waste and consumption of natural resources.</p>	<p>Formal/visible</p> <p>Conservation legislation</p> <p>Biodiversity act</p> <p>Informal/hidden</p> <p>Unquestioned assumptions and beliefs about development and progress.</p> <p>Economic system that measures wealth in economic/money terms only.</p> <p>Competition for land</p>
<p>Environmental pollution</p> <p>Air, water and land pollution through production and manufacturing processes, human waste such as sewerage, vehicles/transport and energy production, etc.</p>	<p>Formal/visible</p> <p>NEMA, IDPs, Air Quality Management Act</p> <p>Informal/hidden</p> <p>Anthropocentric ethical orientations towards nature</p> <p>Lifestyle choices</p> <p>Assumptions about development and growth which lead to over-consumption and wasteful production processes</p>

Unsustainable lifestyles Individual lifestyle choices that are unsustainable and contribute to the above environmental issues.	Formal/visible Marketing of particular lifestyle choices to the exclusion of others Economic system/policies that entrench inequality and widening gap between rich and poor. Informal/hidden Unquestioned pursuit of modernist, consumerist lifestyles. Belief that environmental responsibility rests with external powers such as government or industry.
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In addition to the issues tabled above, Lotz-Sisitka et al. (2005) identified further environmental issues in the case of the Makana Municipality and these include air quality, biodiversity (vegetation and wildlife), sanitation, open space and urban greening, energy, water quality, water quantity, wetlands, livestock management and fire, indicating that there are likely to be any mix of the above mentioned environmental issues and risks in different local government contexts.

Throughout the many different local governments that range from small towns through larger cities to district municipalities, there are potentially many different education practitioners whose work has environmental components. An overview of such potential environmental education practitioners that might benefit from the EETDP qualification is now given.

2.2.2.3 Typical workplace contexts for the EETDP qualification in the local government sector

Examples of contexts where environmental education takes place in local government include, for example, parks and gardens departments that often have environmental education centres with staff conducting environmental education programmes for schools and the public (Wigley & Olvitt, 2005). Various departments have environmental education initiatives, for example the Ethekewini Municipality's Water and Sanitation department have an environmental education centre and extension programmes focusing on environmental issues concerned with water, health and sanitation (*ibid*, 2005). Many local governments have an environmental department responsible for environment and sustainability concerns, often with a strong focus on environment and health issues and employing, for example, Environmental Health Officers (*ibid*, 2005).

Wigley & Olvitt (2005) in the Environmental Education and Training Needs Analysis for the EETDP qualification found that there are two different potential stakeholder groups that could be the beneficiaries of

environmental education and training efforts in local government contexts. The first is internal employees in local government, ranging from higher management all the way through to workers. Hamaamba (2005) identified three key learner groups for environmental education and training in the Makana Municipality in the Eastern Cape. These include management (including councillors); professionals and workers (*ibid*, 2005). The second group involves both technical and professional staff employed within the municipal structures, and associated professionals from the communities in the municipal area who contribute to, and support local environmental management actions. Lotz-Sisitka et al. (2005) in their research to inform an environmental education strategy for the Makana Municipality, identified six learner groups for environmental education and training programmes including municipal employees, learners in formal education institutions (including NGOs and CBOs that provide training), the general public, agricultural and eco-tourism sectors, livestock owners and business and industry (*ibid*, 2005).

Wigley & Olvitt (2005) identified the following specific potential learners for the EETDP qualification in local government contexts:

- NGOs and CBOs:
 - Coordinators, managers, environmental education practitioners, volunteers, part-time education staff, community members and education centre managers of environmental and community development NGOs and CBOs.
- Municipal Environmental Education Centres
 - Part-time staff, volunteers, assistant environmental education officers, admin or grounds staff wanting to develop into environmental education, etc.
 - Professional staff with natural science or teaching background
 - Environmental education staff with years of experience but no formal qualification
- Internal Education and Training (within Municipalities)
 - Skills Development Facilitators, Trainers, HRD Managers, Environment and Health Managers & Inspectors.
- Provincial Government Departments (including agricultural, economic and environmental departments)
 - Extension Officers and Environmental Officers.

In sections 3.2.2 and 3.4.2 and in chapter 4, I describe and discuss the data gathered from curriculum development workshops, and data from an in-depth semi-structured interview that I conducted with an

environmental education practitioner in the Ekurhuleni Municipality. The discussion above provides a more general overview of the local government context and the background against which the data from the interview can be discussed and analysed.

As discussed in section 1.3, the EETDP qualification is workplace-based with up to 70% of the learning intended to take place in the workplace. I will now look at some of the trends and developments in workplace learning.

2.3 Workplace learning

Life-long learning, flexibility, learning society, learning organisations, workplace learning and change management (Boud & Garrick, 1999; Edwards, 1997) have become widely used concepts within the field of adult education and training. In the rapidly changing world of today '... the future of enterprises and the agendas of educational institutions are becoming intimately linked within the present reconceptualisation of work and learning' (Boud & Garrick, 1999:1). These developments in adult education and training have been largely fuelled by globalisation (Boud & Garrick, 1999) and the need for increasingly flexible labour to match and meet the needs of capital (Reich, 1993). While these developments in adult education and training may have originated in response to economic imperatives in the context of globalisation, there is a growing awareness, particularly in 'developing countries' of the opportunity to appropriate the idea(s) of lifelong learning to more human-centred agendas such as development of the whole person including self-esteem, empowerment, citizenship building, community organisation and poverty alleviation (Torres, 2004). Education for Sustainable Development attempts to bridge these two agendas through education that aims to enable reflexive responses (Raven, 2005) to environmental issues and risks (Beck, 1999) that include economic, social and ecological dimensions.

The EETDP qualification is located in the occupationally-directed stream of education and training qualifications registered on the NQF. As an occupationally-directed qualification, the EETDP has been conceptualised so that up to 70% of the learning takes place in the workplace. This has a number of implications for curriculum development for this qualification. As mentioned in Chapter 1, I am a member of the team that is currently developing a curriculum framework and learning support materials for the EETDP qualification. It has been challenging to grapple with the concept of workplace learning and understand the implications for curriculum and materials design. For example, we are finding that there is a subtle shift in emphasis from conventional institutional education where the focus is often on specialised knowledge and content slightly removed from its context to supporting education in the workplace. We are having to consider much more seriously issues such as context, incidental learning opportunities and the role of

workplace colleagues and supervisors as mentors to support learning. This has required us to start with the job requirements and then identify the content/learning support that is required rather than having content as the starting point. Billett (in Boud & Garrick, 1999) suggests two key premises for better understanding workplace learning. The first is that the kinds of activities that people engage in will determine what they learn and secondly, the kind of guidance they receive will determine the quality of this learning (*ibid*, 1999). He goes on to say that workplace learning is 'structured by the everyday activities and goals of the workplace' and because these activities are important to the workplace, the learning that happens cannot be considered as 'incidental, *ad hoc* or informal' but rather as 'authentic and rich opportunities to reinforce and extend individuals' knowledge' (*ibid*, 1999: 152).

Billett (in Boud & Garrick, 1999: 160-162) has developed a model for developing a workplace curriculum. His model has four elements that I will summarise below:

- 1) Movement towards full participation in workplace activities – this involves identifying a pathway of workplace tasks that learners will need to succeed in as they move towards expertise, i.e. how best a learner can be supported from activities of a novice to those of an expert. This often involves increasing levels of accountability and complexity.
- 2) Access to the product (goals) of workplace activities – increases the understanding of the basis on which their performance is judged.
- 3) Direct guidance from more expert others – includes establishing and monitoring the learner on the pathway of tasks, providing direct guidance through questioning, instruction and making knowledge accessible. It is also key that the more knowledgeable 'expert' encourages learners to do the thinking and acting as it is through this ongoing problem-solving that they construct knowledge.
- 4) Indirect guidance provided by others and the physical environment – listening to and observing fellow workers provides models of practice and standards against which learners can measure their progress. The structuring of experience by the workplace and cues and clues provided by the physical environment also provide indirect guidance.

Much of the research and work done on workplace learning is in contexts of standardised workplace procedures and practices such as business or manufacturing. In the context of environmental education, the situation is more complex due to the complex, cross-disciplinary, contested and emerging nature of environmental problems. This is discussed further in the following sections.

2.4 Professional development in environmental education and the NQF in South Africa

Although many universities offer both undergraduate and postgraduate courses in environmental education throughout South Africa, the discussion here will focus on environmental education courses offered as professional development opportunities in workplace and community contexts. The broad context of this study is around the EETDP qualification that has been developed and registered on the NQF and that has been conceptualised as an occupationally-directed (workplace-based) education and training qualification. The intention here is to discuss the characteristics of professional development courses in environmental education and some of their shaping principles.

2.4.1 Characteristics and principles underpinning professional development courses in environmental education

Historically, there has been a widening and deepening of environmental education processes from early approaches that focused almost exclusively on developing awareness through messages about environmental problems through to more constructivist orientations that focus on experiences in various environments and more recent trends towards socially critical and culturally situated approaches involving reflexivity and social change towards more sustainable practices (Lotz-Sisitka, in Loubser 2005; Janse van Rensburg & Lotz-Sisitka, 2000; Fien, 1993; O'Donoghue, 1993). Driving these general trends was a broadening understanding of environmental issues and risks from purely nature-oriented/focused understandings of environmental problems to more holistic and integrated understandings of the role of social structures and practices, including economic and political aspects, and how most environmental problems are partially social in nature. Janse van Rensburg and Lotz (2000) discuss how these shifts and deepening understandings led educators to find new orientations for environmental education to distinguish contemporary environmental education practice from the legacy of association with conservation of nature-in-isolation that positioned peoples' development needs in competition with protection of ecosystems. The new label of 'education for sustainable development' emphasises the link between environmental issues and development issues which are social and economic. Janse van Rensburg and Lotz (*ibid*) note how the notion of sustainability gained currency after the 1992 United Nations Conference on Environment and Development. Increasingly there is critique levelled at appropriations of sustainable development, as the concept of sustainable development is adapted into contexts where the critical approach of earlier proponents has been lost. Sustainable development is now often interpreted as sustainable growth (of the

economy) with the focus on development rather than environmental sustainability. When education for sustainable development is interpreted in this uncritical way, the possibility exists for the *status quo* to be maintained rather than transformed (Lotz-Sisitka, 2004), which has implications for environmental education processes. Lotz-Sisitka (2004) argues that in this context, there is a need for reflexive orientations to engaging with sustainable development discourses and their various appropriations in different contexts.

A range of environmental education professional development courses and initiatives are in existence throughout South and southern Africa. Well-known examples include the Rhodes University/Gold Fields participatory course in environmental education conducted part-time over a full year and the intensive Southern African Development Community – Regional Environmental Education Programme (SADC-REEP) two-month course as well as shorter courses and programmes such as the Wildlife and Environment Society of South Africa's five-day Environmental Educators' courses and the SADC-REEP attachment programmes of about two weeks. Many of these courses, in particular the Gold Fields participatory course, were 'conceptualised as a *participatory* professional development programme ... as an open-entry, open-exit programme with a semi-distance, workplace-based focus' (Lotz-Sisitka & Raven, 2004:69 emphasis original). A number of principles underpin these courses, including critical reflection, reflexivity, social construction of meaning and a concern for history and context (Janse van Rensburg & Le Roux, 1998 cited in Lotz-Sisitka & Raven, 2004). For example, the curriculum framework of the Gold Fields course involves the active deliberation (of the course curriculum) by the learners, responsiveness, a balance of flexibility and structure, assessment as learning and praxis (Lotz, 1999).

These principles that have guided environmental education professional development practice have emerged largely as a response to the realisation that environmental issues are often highly complex, uncertain and contested (Beck, 1999; Scott & Gough, 2003). It is therefore not always possible for environmental educators to present 'facts' and ready-made solutions to learners. The emphasis of environmental education has therefore shifted to one of participatory learning in context that aims for a better understanding of issues in their context. Further, complexity of environmental issues is dealt with through interrogation of the many interrelated social, economic, political and biophysical dimensions of the underlying causes of environmental issues and risks (Scott & Gough, 2003; Lotz, 1999).

Lotz-Sisitka and Raven (2004:85) discuss the difficulty they have encountered in their research of the Gold Fields course in maintaining the above characteristics and principles that underpin a course such as the Gold Fields course within the formal accredited context of the NQF. They suggest that a new challenge exists to draw on the lessons learnt through their and other case study research of courses such as the

Gold Fields course to 'inform the development of more mainstream courses' in the context of the NQF. These lessons include, for example, the development of alternative assessment practices 'which are in themselves *processes of learning* and which respond to the open-entry, open-exit framework' of the Gold Fields course (*ibid*, 2004:85, emphasis original). Further lessons have been learnt around the participatory orientation of the course that 'does not fall easily into the realm of normal institutional practice in higher education'. Lastly, they suggest (*ibid*, 2004:85) that the 'in-depth probing of cases in context' will help to provide a way of engaging with tensions such as the 'more instrumentalist approaches to course design, assessment and accreditation' of environmental education courses registered on the NQF.

2.4.2 Environmental Education and the South African NQF

The NQF and the EETDP qualification have been introduced in detail in section 1.2. The NQF and its implementation has been the subject of much critical reflection with some of the main debates centred around epistemological issues such as the educational shortcomings of an outcomes-based framework based on unit standards and focused on competence (Ensor, 2003) and whether or not the educational foundations of the NQF are able to live up to its emancipatory and egalitarian intent (Allais, 2003). Raven's (2005) research reports, for example, that the NQF does not provide an adequate competence model that allows for Beck's (1992, 1999) conceptualisation of both knowledge and unawareness, both of which are central to understanding and engaging with environmental risk, and thus to environmental education processes in a risk society. Beck (1999) stresses the importance for learning of the inability to know, in other words the 'unawareness' that surrounds many environmental risks associated with modernisation, such as genetic engineering, for example. He asks if neither the 'optimism of the protagonists [of, for example, genetic engineering] nor the pessimism of their critics is based on knowledge' then what decision about the large scale use of this technology can be made (Beck, 1999:124)? Does this mean it should go ahead regardless because the risks cannot be known or that it should not be used at all for the same reason? It is the often highly contested nature of knowledge and the unawareness surrounding many environmental issues and risks that creates a challenge for environmental educators. This is particularly so in the context of a NQF that has emerged as a response to skills shortages and is aimed at increasing economic productivity and is therefore primarily designed for the development of specific, uncontested knowledge and skills often within a very limited or specialised range of workplace activities.

It is this contested nature of knowledge and unawareness around environmental risks that created the need for a better understanding of the epistemologies surrounding notions of both environment and education in the cases presented in this thesis.

2.5 Epistemology and understandings of environment and education

Epistemology, defined by the Oxford Dictionary (Tulloch, 1991: 496), refers to “theory of knowledge, especially with regards to its methods and validation” i.e. how knowledge is created and validated, and how knowledge is viewed. In this section I look briefly at factors that have shaped the way that knowledge is viewed and validated in the natural and social sciences generally followed by a more specific discussion on epistemology in the context of the study.

Understanding the historical shaping influences on what has become accepted as valid knowledge in society today and even a basic unravelling of the complexity of competing interests and knowledge claims, particularly around environmental risks, is far beyond the scope of this study. Society is too complex and heterogeneous with a huge diversity of cultures and sub-cultures each with their own version of what constitutes valid knowledge, even within what is often referred to very generally as ‘western society’, for an in-depth review of epistemology to be possible here. Rather, I will limit the discussion of epistemology to the concern of the study. Firstly, this will require an understanding of how knowledge of the environment and what constitutes an ‘environmental issue’ is developed and validated in the contexts of the cases dealt with in this study (see section 3.2.2). Secondly, it will require an understanding of how education is viewed and understood in each case. The study will go on to question the perceived role of education in responding to environment and sustainability issues in each of the cases.

Scientific explanation is generally regarded as the correct method of thinking (Bertilsson in Anderson & Kaspersen, 2000) and therefore of validating knowledge in the world today. Bertilsson (*ibid*, 2000) traces this back to Aristotle and the influence of his system of logic that involves deduction, the drawing of conclusions from given premises, and induction, the development of generalised statements from simple observations. Aristotle also distinguished between various kinds of causal relations between events, structures and processes (*ibid*, 2000). His *causa efficiens* refers to an external cause and *causa finalis* to forces inherent within phenomena themselves and are ‘realised in the course of development of a pre-determined aim’ (*ibid*, 2000:492). Bertilsson (*ibid*, 2000) discusses how modern, experimental natural science that insists that causes precede effects, has basically excluded the possibility of *causa finalis*, the idea that there can be any intention or pre-determined aim in natural events. The social sciences on the other hand, have not really been able to ‘release themselves from the thesis of final cause explanations’ (*ibid*, 2000: 493). This has led to conflict within the social sciences between those that believe that human behaviour can be explained within the epistemological frameworks of the natural sciences as a matter of external cause and effect (behaviourism) and ‘those who believe that human actions must be understood in the light of the actor’s [conscious and/or unconscious] intentions’ (*ibid*, 2000:494). Bertilsson (*ibid*, 2000),

quoting Eriksson (1988), suggests that social science emerged with the realisation that the market (economy) is a distinct, self-regulatory system not directly under the control of any individuals, the state and the law. Society was suddenly seen as much larger and more complicated (*ibid*, 2000) when it was realised that there are structures that are beyond any conscious control by a powerful individual or institution such as the state and that are the result of the collective actions of individuals in society.

Bertilsson (2000) also discusses the role of *episteme*, *phronesis* and *techne*, concepts developed during the period of Antiquity, in shaping what knowledge and what forms of knowledge are viewed as useful and valid in the natural and social sciences. *Episteme* is a form of knowledge based on theoretical analysis that seeks to achieve 'true knowledge' (*ibid*, 2000:501). *Phronesis* is a form of knowledge related to the ability to make judgments and correct decisions while *techne* is related to the knowledge associated with producing something (*ibid*, 2000). Bertilsson (2000) argues that *techne* has become the dominant form of knowledge, and is therefore considered more valid, while knowledge forms associated with *episteme* and *phronesis* have become marginalised in modern society. *Techne* could be said to dominate more traditional forms of vocational education and training (from which the NQF and life-long learning theory and practice in South Africa was originally derived). Life-long learning is increasingly characterising discourses on education and training in countries around the world, including South Africa, as South Africa seeks to develop a more competitive, knowledge and skills-based economy.

The tension between these epistemological frameworks and the way they have shaped understandings of environment and the role of environmental education is not unfamiliar to many environmental education practitioners today. The understanding of environment and environmental problems from a natural science perspective, based solely on the idea of *causa efficiens*, is likely to lead to technical understandings of environmental problems focused on the biophysical manifestations of environmental issues and the belief that the resolution of the problems lies in better (technical) management of the problem through a better understanding of, for example, ecology. Knowledge that will be viewed as valid and useful in this instance will be knowledge that can be scientifically proven through experiments (*techne*) that prove cause and effect relationships in the context of environmental problems. The role of education is seen as one of developing appropriate communication mechanisms to provide learners with the right technical knowledge (awareness) about the environmental issue in the belief that this will cause or enable them to change their behaviour accordingly.

Different understandings of environment and the role of environmental education are apparent from a social sciences perspective that draws on both the notion of *causa efficiens* and *causa finalis*. Environment and

environmental problems are not seen as solely technical biophysical problems that can be reduced to linear cause and effect equations. The role of people who act with intention within social systems and the complex reciprocal relationship between social structures and individual action where structure constrains action while at the same time enabling it (Giddens, 1984; Archer, 1982) becomes an important consideration and component of understandings of environment and environmental problems. Ways of knowing that enable people to make value-based judgments and decisions (*phronesis*) about appropriate action within a particular situation will lead to different understandings of environmental problems. More importantly, it will also lead to different approaches and purposes in education. The challenge for environmental education becomes one of working with learners to understand environmental (now understood much more broadly than biophysical) problems in their context or situation. It will involve interrogating the conscious and unconscious intentions behind why we do things the way we do. These investigations will need to consider many different forms of knowledge and choices will need to be made with the learners about their validity and usefulness in resolving the environmental issues concerned (Scott & Gough, 2003). This will include technical knowledge from the natural sciences that focuses on biophysical components of the issue and technical management solutions. It will also include ways of knowing that value and see as valid the ability (and responsibility) of individuals within social systems and structures to make judgments and decisions (*phronesis*) about appropriate action to resolve environmental problems.

In my view, there is a need for careful analysis and consideration of epistemology in the development of NQF accredited environmental education and training learning programmes, if environmental education courses are to retain and further develop the characteristics and principles described in section 2.4 and if they are to provide for environmental education and training that is socially transformative (Janse van Rensburg, 1995 in Lotz-Sisitka & Raven, 2004). As implied in Raven's (2005) research, and in Jenkin's (2000) research, this requires a careful study of how different epistemologies, or theories of knowledge, arise and become validated in different contexts, and how this may influence learning. The significance of context has long been recognised in environmental education and training (see for example Robottom, 1987; Lotz, 1999; Raven, 2005), and this study aims to help inform a curriculum that is flexible enough to respond to the environmental education "meaning-making" needs of individuals and organisations in the contexts that will be studied rather than a generalised curriculum that would then be applied indiscriminately in each of the contexts.

2.6 Structure and agency

In addition to epistemological issues concerning workplace learning in the NQF, the institutional structures within organisations will have a role to play in shaping the development of environmental learning programmes (Raven, 2005; Jenkin, 2000; Motsa, 2004). These institutional structures include, for example, management policies and structures, operational procedures and the organisation of activities around specialised disciplines (Hamaamba, 2005). An understanding of these institutional structures will be required in order to develop environmental education and training programmes that enable transformation of the organisation's activities towards environmental sustainability. In her thesis that explored meaning-making in environmental education and training for industry, business and local government, Jenkin (2000:115) quotes a learner on an industry environmental education course: "...structural barriers created in the organisation and its associated politics will continue for the time being, to be a weakness in this process [of environmental change]." A similar finding is provided by Motsa (2004) where structural factors (such as school time-tables and political structures) influenced the possibilities for environmental and educational changes in Swaziland.

In this section, I will briefly discuss some of the theory around structure and agency that will then be drawn on in the analysis of data in chapter five. In a discussion of Anthony Giddens's structuration theory, Slattery (2003) says that social structures involve rules and resources that are key to social order and that these rules can be both formal and informal, resulting in both required behaviour and expected behaviour. Agency is about choice or free will (Barnes, 2000). Humans can be said to have agency when their actions are voluntary and not constrained or caused by external forces or powers. There has been a great deal of debate in the social sciences about the relative degree of agency that humans possess (voluntarism) as opposed to the level of constraint or causation (determinism) of our actions by social structures (Giddens, 1984; Archer, 1982; Barnes, 2000). While this debate and much of the theory around structure and agency is fairly abstract, I do think that a brief discussion of these ideas will be useful in the context of this study that is trying to gain insights into some of the structural factors that influence environmental education practitioners in their work contexts.

In Giddens's structuration theory, he suggests that individuals have the power and freedom to express themselves within the structures of society and that this individual freedom can cause changes in the structures over time (Slattery, 2003). According to Giddens, structuration is an ongoing reflexive process in which human action creates social structures that then sustain and control human behaviour but which themselves are constantly changing through evolution, and sometimes rapidly through revolution, caused by

collective human action (*ibid*, 2003). Criticisms of structuration theory include the idea that Giddens has bound up the concepts of structure and agency too tightly and that they are actually two different concepts that are not easy to reconcile (Archer, 1982). Archer (1982) also questions the power or ability of individual actors to change structures, suggesting that this individual agency is overemphasised in Giddens' theory. While there is agreement that structuration theory is useful in general, Layder (1997) and Archer (1998) suggest that agency and structure need to be analysed separately, in an analytical rather than philosophical dualism, for the relative force of each to be understood, and so that the interplay between structure and agency can be better understood.

Archer (1998) argues that agency is emergent from the interaction between our human selfhood and social reality (including structure - i.e. structural conditions shape and influence agency), and that this process of emergence can explain social changes that take place. She argues that through social interaction, agents are able to change structures, and that structures are therefore emergent from social interactions that arise in structural contexts. Sometimes the structural conditions *enable* emergence of agency to elaborate or change the nature of earlier structural conditions, leading to what she calls **morphogenesis** (social changes). Sometimes structural conditions *constrain* the emergence of agency and associated structural elaborations or changes, leading to what she calls **morphostasis** (things don't change).

Both Giddens and Archer describe reflexivity as an important dimension of social change. They describe humans as 'reflexive beings' capable of reflexively reviewing and acting in the world to bring about changes. Giddens develops his structuration theory based on this, and Archer theorises human agency through discussions on 'the internal conversations' (Archer, 2003:9) or reflexive deliberations that people engage in when making choices on how they could / should act, in response to structural constraints and other influences. This reflexive deliberation is the means through which agents are able to elaborate (change) or reproduce social structure.

2.7 Reflexivity and environmental learning

Reflexivity is therefore an important consideration for environmental educators who are concerned with social transformation and change. Through reflexivity, environmental educators are able to consciously consider structural factors that can be both enabling and constraining of agency in the context of their education practice. Insights gained through such reflexive consideration of their practice will hopefully enable environmental education practitioners to better understand how their education practice may be contributing to the reproduction of or changing of social structures that constrain or enable environmental

change. This will include, for example, social structures that are not highly visible, such as epistemologies of education and environment, and more visible structures such as education or environmental legislation and policy.

Another reason why the development of reflexivity through learning is an important consideration for environmental educators is that environmental issues are complex, uncertain, contested and emerging (see section 2.4). The nature of knowledge and the lack of knowledge surrounding environment does not, therefore, allow for a technicist approach to education where ready made solutions and facts can be presented to learners. I will start by looking at the concept of reflexivity as understood in the social sciences, in particular through the work of Beck (1992, 1999, 2000) and then move on more specifically to the implications of reflexivity for environmental education.

Beck's (1992) main thesis is that in advanced modernity, the social production of wealth is accompanied by the social production of risks and that the problems and conflicts relating to wealth distribution in a society of scarcity overlap with problems and conflicts that arise from production, definition and distribution of technoscientifically produced risks. The incidental and unwanted side-effects of industrial modernisation are forcing modern society to become reflexive: to rethink its modes of production, values and social/political/economic structures – society is forced to become concerned about its unintended consequences, risks and their implications on its foundations (Adam, Beck and Van Loon, 2000). This reflexivity is partly as a result of the democratic nature of risks in that they affect rich and poor, powerful and weak alike (at least in the case of the most extreme risks such as climate change and nuclear technology). Beck (1999) distinguishes between two overlapping meanings of reflexivity with the first linked to knowledge and reflection of knowledge on the foundations, consequences and problems of the modernisation process. The second meaning is tied to the unintended consequences of modernisation 'in the sense of the effect or preventative effect of *non-knowing*' (Beck, 1999: 109, emphasis original). In this second meaning, Beck (1999:119, emphasis original) claims that '*the medium of reflexive modernisation is not knowledge, but – more or less reflexive – unawareness.*' Beck (1999:120) says that the unintended consequences of modernisation do not necessarily imply no knowledge at all but a conflict of knowledge between different experts, ordinary knowledge and the knowledge of social movements and that 'this conflict does not run along clear and unambiguous associations of knowledge and unawareness'.

Raven (2005:18) examines the concept of reflexivity in relation to practice as 'the idea that theory and practice are inextricably linked and that we can better come to understand our practice through an interrogation of the theoretical ideas underpinning and embedded in action.' She goes on to suggest that by

linking this idea of reflexivity in practice (praxis) to Beck's (1999) ideas of reflexivity 'the theory-practice relationship plays a key role in supporting processes of knowledge construction and uncovering unawareness to open up opportunities and expand the potential for change' (Raven, 2005: 19).

The South African Qualifications Authority (SAQA) has included the idea of reflexivity in the formulation of the unit standards based qualifications on the NQF. The notion of applied competence is used in NQF qualifications as the interrelation between practical, foundational and reflexive competence (Department of Labour, 1997; Department of Education, 2000). Practical competence is the demonstrated ability to perform a set of tasks, foundational competence is the demonstrated understanding of what one is doing and why, and reflexive competence is the ability to connect what is known with what is done so that practitioners can learn from their actions and adapt to new or unexpected situations. Raven (2005:20) critiques the application of reflexivity in the context of the NQF as having a reactive approach to engagement with change processes due to its definition as the 'ability to adapt to change or unforeseen circumstances'.

The role of learners on the EETDP learnership will be, under supervision in a structured environment, to make meaningful contributions to environmental change through education and to work with others to undertake environmental action projects or facilitate environmental learning programmes (SAQA, 2005:1). The complexity of environmental issues and risks and their often contested nature (Beck, 1992; Lotz, 1999) has led to a recognition that technocratic approaches to environmental education and training are not appropriate in change-oriented professional development processes (Robottom, 1987; Lotz, 1999; Raven, 2004). Recently research has been undertaken into the development of reflexive competence within the NQF, to explore its transformative potential for environmental education professional development. Raven (2005:18) notes that the development of reflexivity in practice will hopefully enable "...action for change through a critical review of practice". This orientation to learning has the potential to help EETDP learners meet the expectation that they "... make a meaningful contribution to environmental change" (SAQA, 2005:1). In an analysis of education and training needs implied in selected key environmental legislation, Olvitt, Malema and Lotz-Sisitka (2004:23) identified seven categories of competence that were further analysed in terms of practical, foundational and reflexive competence. Drawing on earlier definitions provided in the Education and Training Development Practices project and the Norms and Standards for Educators, they describe reflexive competence as the ability of learners to '... reflect critically on their work and to seek ways of strengthening their practice'. Such reflexive skills are also seen to be important in the context of the notion of a learning society and life-long learning in a rapidly changing world that demands flexibility and adaptability amongst workers/learners (Edwards, 1997).

2.8 Conclusion

This study seeks a better understanding of the agricultural and local government contexts with a particular focus on understanding epistemology and institutional structures to inform the development a curriculum for environmental education and training in these sectors, in the context of the EETDP qualification.

In this research I aim to explore workplace epistemologies and institutional structures as key dimensions of workplace learning contexts. I aim to explore these to inform curriculum development for the EETDP qualification, in ways that will be enabling of reflexive learning processes (and agency) within the EETDP qualification. Care will be required in the development of the EETDP curriculum to avoid incompatibility with the workplace cultures, operational procedures, management systems and training styles that are often 'technicist, individualistic and reductionist', particularly in industry contexts (Shaw and Dingle, 1998 cited in Lotz-Sisitka, 2005). Based on early contextual profiling (see 2.2 above; Wigley & Olvitt, 2005) and the research insights cited above, it would seem that an understanding of workplace epistemologies and institutional structures is needed to deepen contextual understandings informing curriculum development for the EETDP qualification, as these may impact on the agency of learners in the workplace in each of the contexts (as shown by Jenkin, 2000 and Motsa, 2004). This is required so that a curriculum can be developed that is both sensitive to these epistemologies and structures and yet challenging of them, if the curriculum is to support reflexive learning processes as outlined above.

The theoretical and contextual perspectives discussed in this chapter, will be drawn on in Chapters 5 and 6 of the study, when the findings of the study in the agricultural and local government cases are interpreted and discussed in more depth. These theoretical and contextual perspectives, as scoped in this chapter, have also been helpful in guiding some of the data generation work in the study, and have also provided starting points for the data analysis work. This has allowed for focus and depth in considering the research question. In the next chapter I discuss the research methodology and research design to explain how I undertook the investigation.

Chapter 3 Methodology: research design decisions

3.1 Introduction

In this chapter I describe the research process and activities that were used to investigate the research question of how an understanding of workplace epistemologies and institutional structures can inform curriculum development that is enabling of reflexive environmental education and training processes. I explain and justify the methodology, methods and research activities and relate these to the research question and goals.

I start by explaining the qualitative, interpretive orientation to the research in relation to the purpose of the research (section 3.2.1) and then move on to describe and justify the use of case studies for this research (section 3.2.2). I then briefly discuss the three data generating methods from a theoretical perspective (section 3.3) followed by a more detailed description of the data generating activities that I undertook in this study (section 3.4). I also discuss how I organised, interpreted and analysed the data (section 3.5) before I present it in the next chapter. Finally, I look at how I have dealt with the issues of trustworthiness and ethics in this study (section 3.6), thus addressing issues of research quality.

3.2 Research methodology

3.2.1 Research orientation

The purpose of the research, outlined in section 1.5, has a bearing on the orientation of the research (McTaggart, 1991). With these goals in mind, it is apparent that the study is not aimed at developing an explanation of events or to prove or disprove a theory or hypothesis. Looking at the research question and goals, it is clear that the research aims to develop deeper understandings within two very specific contexts located in the broader context of the EETDP qualification. An explanation for the choice of an interpretive orientation to this research has been mentioned in section 2.5 where I discussed Aristotle's notions of *causa efficiens* and *causa finalis* (Bertilsson in Anderson & Kaspersen, 2000). According to Connole (1998), understanding in the natural sciences takes place through the method of causal explanation from the outside – this links with the adoption by the natural sciences of Aristotle's notion of *causa efficiens*: that external causes precede effects. Connole (1998:14), quoting Giddens (1976), says that in the human

sciences 'understanding is a method of studying humanity through an empathic identification with the other, a grasping of their subjective experience' and that 'interpretive perspectives have come to be regarded as an alternative epistemological basis for the human sciences.' She goes on to say that from an interpretive perspective, meanings are generated and shared through language and that the task of the researcher is to understand what is happening, not through detachment but through active involvement in the process of negotiated meaning. This is particularly relevant to the goals of this study that is concerned with gaining insights into the way that the environment and education are understood and what the institutional structures are that should be considered for workplace-based environmental education in the two cases studied here. An interpretive perspective has allowed me to gain insights into these two contexts as they are known and understood by the people who work in these contexts. Janse van Rensburg (2001:16) says that an interpretive approach reflects an '... interest in contextual meaning-making rather than generalised rules'. An interpretive approach has allowed me to improve my understanding of '... the meanings participants actually bring to bear on their lives' (McTaggart, 1991:3) (see Chapter 4 and 5).

3.2.2 Cases within a case: a nested approach to case study

The approach used in this study is the nested case-study approach described by Lotz-Sisitka and Raven (2004) to describe the range of case studies undertaken over a ten-year period on the Gold Fields participatory course in environmental education. In their research, they describe how a range of different case studies each focused on different aspects but all were conducted in the broader context of the Gold Fields course (a broader case study). They describe how (together), the individual case studies provide a 'picture of the dynamic and ever-changing nature of professional development practice in environmental education ... and of engaging with hybridity, ambivalence and multidimensional patterns of change in different contexts within the broader context of lifelong learning' (*ibid*, 2004:73). While this study involves fewer cases over a more confined period of time, the approach is similar and involves the exploration of two cases, one within an agricultural context and the other within a local government context, both in the broader context of curriculum development for the EETDP qualification (see Figure 1.1).

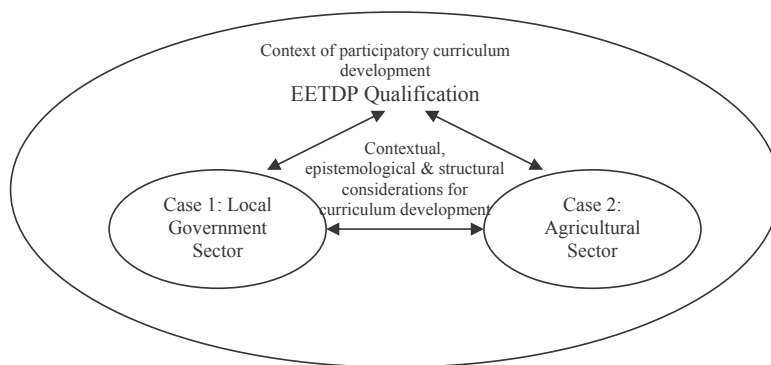


Figure 1.1 This study: a local government and an agricultural case nested within the broader context of curriculum development for the EETDP qualification (adapted from: Lotz-Sisitka & Raven (2004:73).

This study is a case of the EETDP qualification, an NQF accredited adult professional development qualification for environmental education practitioners in a range of contexts or sectors including those working in conservation, agriculture, local government, business and industry and civil society organisations (Wigley & Olvitt, 2005). Due to limitations imposed by both time and cost, I have restricted the study to focus on two of these sectors: agriculture and local government, with my choice having been affected by a number of factors.

Foremost was the issue of access. Through the participatory research processes that contributed to the needs analysis for the EETDP qualification (*ibid*, 2005), initial contact was made with the two case study institutions presented as nested cases in this study. The individuals interviewed in the two case contexts have not necessarily been part of the process of researching the needs and developing a curriculum for the EETDP qualification (although in one case the individual concerned has contributed), but the institutions for which they work have expressed an interest in the EETDP qualification for the professional development of relevant personnel in these institutions. This is a particularly important factor as this research aims to contribute to better understandings of these contexts to enable the development of a more relevant and responsive curriculum for the EETDP qualification for these sectors.

A second factor in the choice of the two nested cases was my personal interest. As one of the authors of the needs analysis for the EETDP qualification (Wigley & Olvitt, 2005), I have conducted preliminary research into all of the sectors mentioned above. Through this earlier research, I have become very interested in how environmental education is being understood and developed in contexts where it is a relatively new activity,

compared to, for example, the conservation sector that has long been engaged with environmental education.

Thirdly, I believe that the lessons learnt through these two cases will provide valuable insights that can be used to inform the development of the EETDP curriculum for the other three sectors too. While generalisation from case studies is often seen as problematic, Flyvbjerg (2001) provides insights into how the strategic choice of a case can add to its potential 'generalisability' (or broader use) and how this depends to a large extent on the purpose of the study. In this study, I don't expect that *all* the findings from the two cases will be 'generalisable' or useful to the other three sectors with which the EETDP qualification is concerned. However, I do expect that the study will be useful for certain considerations for the other three sectors in that certain key considerations for the curriculum development will be highlighted and therefore future enquiry into the other sectors can be more focused.

Case-study, according to MacDonald and Walker (1975, cited in Bassey 1999:24) is '... the examination of an instance in action' and involves 'the collection and recording of data about a case or cases' (Stenhouse, 1985 cited in Bassey 1999:25). Case study as a research method in the social sciences has not been short of critics and Flyvbjerg (2001:66-67) highlights five key criticisms, or what he calls misunderstandings, of case studies as:

- 1) general, theoretical (context-independent) knowledge is more valuable than concrete, practical (context-dependent) knowledge;
- 2) one cannot generalise on the basis of an individual case; therefore, the case study cannot contribute to scientific development;
- 3) the case study is most useful for generating hypotheses; that is, in the first stage of a total research process, while other methods are more suitable for hypothesis testing and theory building;
- 4) the case study contains a bias toward verification, that is, a tendency to confirm the researcher's preconceived notions;
- 5) it is often difficult to develop general propositions and theories on the basis of specific case studies.

In a detailed analysis that draws on a wide range of research, Flyvbjerg (2001) provides a counter-argument to these five criticisms. For example he explains how Plato's teachings have had a huge impact on conventional scientific wisdom and that the success of the hypothetical-deductive scientific model that has been so influential in the natural sciences has often been assumed to be relevant in the social sciences too (*ibid*, 2001), hence the high value placed on context-independent, objective knowledge (see section 2.5).

Without rejecting the relevance of quantitative scientific methods in the social sciences, Flyvbjerg (2001) provides a strong argument for more context-specific, small-scale, ungeneralised, detailed narratives that case studies can provide.

Stenhouse (1985:49, cited in Bassey, 1999) identifies four styles of case study, one of which is ethnographic case studies where a case is studied ‘... in depth by participant observation supported by interview....’. He notes that this approach to case study explores the ‘... understandings of the actors in the case and offers from the outsider’s standpoint explanations that emphasise causal or structural patterns...’ (*ibid*, 1985:49). While I do not have a particular focus in this study on emphasising causal patterns, this approach does resonate with the aim of this study in terms of generating an understanding of the epistemologies that may shape learning in the different case contexts, as well as an understanding of the institutional structures as conceived by the interviewees in the two cases presented here. The ethnographic case study is usually used for detailed single site studies (Bassey, 1999) whereas in this research I have focused on two nested cases without going into the level of detail one would associate with an ethnographic study.

The social epistemology embedded in a case study enquiry (Lotz-Sisitka & Raven, 2004) into environmental education processes is an important consideration in terms of the goals of this study. The intent is not to ‘emulate natural science and produce explanatory and predictive or epistemic theory’ (Flyvbjerg 2001 in Lotz-Sisitka and Raven, 2004:72) but for the study to be a ‘form of social praxis ... involving reflexive analysis of values and interests in social contexts’ (*ibid*, 2004:72). These ideas have had implications for both the way in which the case study data was generated and its interpretation. For example, in the generation of the data through semi-structured interviews, the interviews took on an almost conversational character as I reflexively probed further into various responses to the guiding questions that I had framed beforehand. A more structured interview format would not have served the purpose of the study: to gain an understanding of how the interviewees understand and use knowledge of the environment and education in their practice, what knowledge is valued in their workplace, and how knowledge creation processes take place in their workplace.

3.3 Research methods

In this study, I have used three interpretive methods that have allowed me to negotiate meaning with the environmental education practitioners that I have engaged with through curriculum planning workshops, semi-structured interviews and document analysis. In this section, I provide a general discussion about the

methods and their relevance to this study. In section 3.4, I then go into a detailed description of the application of these methods.

3.3.1 Curriculum development workshops

Over the period from September 2004 to November 2004, I was involved in conducting a number of curriculum deliberation workshops for the EETDP qualification. These included workshops that focused on identifying and elaborating on the environmental education and training needs in a number of sectors, including the local government and agricultural sectors. The data from these workshops informed the writing of the needs analysis for the EETDP qualification (Wigley & Olvitt, 2005, see section 1.4). I coordinated a number of curriculum and materials writing workshops for the EETDP qualification from April to November 2005. These workshops involved the participation of environmental education practitioners from the conservation, agricultural, local government, industry and civil society sectors. In this section, I briefly discuss workshops as a research method. A discussion of the techniques used in the workshop to generate the data and how I later organised and analysed the data are discussed in sections 3.4 and 3.5.

A question that needs to be asked is whether this method is compatible with the broader interpretive orientation of this study. To answer this question, it may be useful to first consider workshops in the specific socio-political and historical context in which they take place in South Africa. Workshops have become a popular forum for participatory decision-making and problem solving in South Africa as the dominant authoritarian political regime of the apartheid government has been replaced by a participatory democracy (Ashwell, 1997). The level to which meaningful participation through sharing of knowledge and experiences takes place will, to an extent, depend on how the workshop is planned and coordinated, issues that will be discussed in more detail later. However, the concern for participation and sharing of experiences from the context of the participants in the workshop does seem appropriate for an interpretive study that is interested in 'contextual meaning making' (Janse van Rensburg, 2001:16).

3.3.2 Semi-structured interviews

An interview can be defined simply as a conversation with the purpose of gathering information (Berg, 1998). Before preparing for and conducting the interviews, I considered very carefully what sort of information I was hoping to gain. With the research interest in understanding meaning-making and how environment and education are understood by the interviewees, a structured interview would not allow the flexibility to

respond and probe further into areas of interest to the study as the interview progressed. Instead, I drew on what Berg (1998:59) refers to as a 'dramaturgical orientation' where the interview is 'viewed as a dynamic, meaning-making occasion where the actual circumstance of the meaning construction is important'. I conducted semi-structured interviews or what Berg (1998) calls a semi-standardised interview. In this type of interview, a number of predetermined questions are developed in an interview schedule but the interviewer is expected to probe beyond the answers given. This type of interview has allowed me to develop an understanding of the perceptions of the interviewees and how they 'come to attach certain meanings to phenomena or events' (Berg, 1998:64).

3.3.3 Document analysis

Documents can be the source of historical and contextual data (Cohen *et al.*, 1994) necessary for understanding the cultural context within the area of study. In this study, I include an analysis of documents in the range of data, drawing on documents such as educational materials from the two case study contexts, and the broader EETDP curriculum development process (see section 3.4.3). The inclusion of extracts from documents in this study provides for both a deeper and broader understanding (Holliday, 2002) of the contexts and also provides a means to triangulate the data generated in the workshops and semi-structured interviews.

3.4 Data generation

I have used three techniques to gather data for this research including workshops, semi-structured interviews and document analysis. Having briefly discussed these three methods above in relation to this study in general above, I now focus specifically on the details of how I generated the data for this research through these three methods.

In order to make decisions about my choice of methods and the type of data that each would yield for this study, I developed a theoretical vantage point that isolated key aspects of my research question and goals and elaborated slightly on each component. This theoretical vantage point started out as a rough, hand-drawn heuristic that I have reproduced here (fig 1.2).

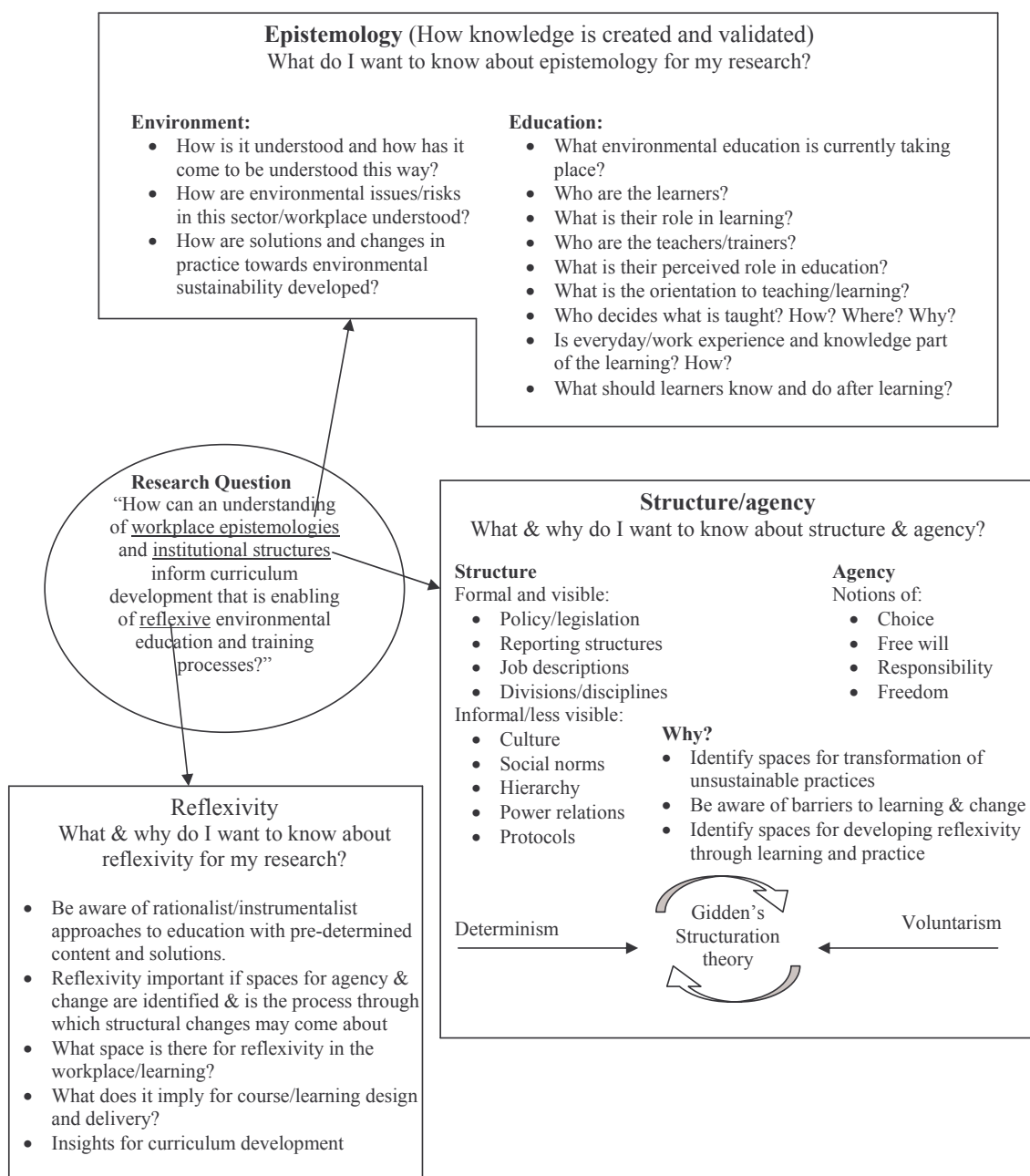


Figure 1.2 A theoretical vantage point in the form of a heuristic that elaborates on key focuses of the research question and provided guidance in the choice and design of the research methods.

With the research question in somewhat sharper focus, I then focused my attention on deciding what research methods would best provide the sort of evidence that could provide the necessary insights. The choice of a case study as the overall approach seemed natural because of the confined context of the research: that of the curriculum development process for the EETDP qualification. However, even within this confined context, through the needs analysis research we had identified five sub-sectors (Wigley & Olvitt, 2005) in which the delivery of the EETDP qualification would take place. This existence of sub-contexts within the broader context of the EETDP qualification led to the choice of the nested case study approach described in section 3.2.2 where the reasons for choosing two nested cases is also explained.

My first point of departure, after deciding on the nested case study approach, was to determine what naturally occurring data existed that could justifiably be used in this research. In 2004, as part of my work, I was responsible for conducting a series of workshops as part of a needs analysis for the EETDP qualification. These workshops had included one for the agricultural sector on 5-6 October 2004 and one for the local government sector on 10-11 November 2004. In 2005 I had coordinated a series of curriculum planning and materials writing workshops for the EETDP qualification with the first of these taking place from 27-30 June 2005. As the coordinator of these workshops, I have in my possession, all of the original notes made by participants in the various group activities at the workshops, the official proceedings and the needs analysis report that I had co-written after the needs analysis workshops in 2004. After briefly reading through this rich collection of data, I realised that it could provide good insights into all three dimensions of my research question with its interest in epistemology and understandings of environment and education, institutional structures and reflexivity. I therefore decided to use these three workshops and the data generated through them as one of the methods informing this study.

One weakness of the data from these workshops is that, although it was generated by a diverse group of individuals attending the workshops, all of whom work in the sector that they represented, due to the nature of and time constraints of the workshops, it was not possible to delve deeply in terms of any one specific work context in each of the sectors. So the feedback from the workshops, although specific to each sector, was fairly generic in terms of that sector as a whole. I realised that to gain a real understanding of epistemologies around the environment and education and the institutional structures in any specific workplace I would need to engage much more closely with individuals in a specific workplace for both sectors that this study is concerned with. I therefore decided to conduct a semi-structured interview in both the contexts explored in this study. In choosing candidates, I sought to interview an individual who would fit the profile of a potential candidate for the EETDP qualification. In the local government sector, I interviewed an Environmental Officer – Environmental Education and Awareness in the Ekurhuleni Municipality in

Gauteng and for the agricultural sector, I interviewed an Agricultural Extension Officer in the KwaZulu-Natal Department of Agriculture and Environment Affairs.

To support and deepen the data from the two semi-structured interviews and as a form of triangulation, I obtained from the two interviewees copies of some of the educational materials that they use in their work. An analysis of these documents is the third method I have conducted for this study.

I initially also considered undertaking field-based observations (work study shadowing) of two participants in the two workplace contexts, and while I realise that this would have provided further depth of insight into the research question, I made an assessment at the time that the data generated through the workshops, interviews and training materials was already a large 'corpus' of data for a study of limited scope. I then decided to analyse this data and, if I found it to be inadequate to address the research question in enough depth for the scope of this study, I would follow up with the field-based work study observations. In the final analysis, I made a decision that the data generated by the three methods introduced above provided an adequate opening enquiry into the research question as anticipated for a study of limited scope. Workplace-based observations have therefore been recommended as a strategy to deepen and extend the research undertaken in this study, and will no doubt provide further insight into the research question (as discussed in section 6.4).

I now describe the data generation techniques used for these three methods followed by a more detailed description of how the data generated was organised and analysed in section 3.5.

3.4.1 Curriculum development workshops

Ashwell (1997:2) suggests that research workshops should pay particular attention to:

- clarity on the purpose of the workshop,
- commitment to preparing participants so that they come to the workshop able to make an informed contribution, and
- consideration of effective but unobtrusive methods of recording anticipated and unexpected outcomes.

A detailed two-page invitation (Appendix 1) as well as a five--page orientation document was distributed widely throughout the agricultural and local government sectors in which the purpose and expected

outcomes of the workshop were clearly explained, as well as a description of the sort of people who should attend. Once participants had confirmed their attendance, they also received a detailed programme for the workshop.

A total of 54 people attended the workshop in Pietermaritzburg on 5 - 6 October 2004 which was a combined workshop for the agriculture and conservation sectors. About half the participants were from the agriculture sector and represented a diversity of organisations and individuals including NGOs, governmental departments, an agricultural research institution and private farmers.

The feedback most relevant to this study has been summarised from the participant feedback from one of the group activities that took place on the first day of the workshop. In this activity, the workshop was divided into smaller groups of about six participants per group and asked to 'discuss and list the environmental education and training needs for your specific context under the three categories:

- core environmental knowledge needs
- personal and professional development needs
- education and learning theory needs'

(taken from workshop flip-chart)

The identification of these three categories emerged from the workshop deliberations leading up to this activity. I have summarised the feedback from the agricultural groups and in the organisation of the data I coded the feedback (AG-NA 1, 2, 3, 4, 5 & 6).

In a separate workshop held in Johannesburg I asked participants at a unit standards generating workshop for the Primary Agriculture SETA (PAETA) to list the most important environmental issues and risks that education and training in the agricultural sector should respond to. This group of people represent a broad spectrum of stakeholders in the agriculture sector in South Africa and were at the workshop to generate unit standards that will shape all future SAQA accredited training in the agricultural sector. Their contributions from this activity have been recorded and in the later analysis coded as AG-NA7 – 28.

A total of 27 people attended the local government workshop held in Durban on 10 - 11 November 2004. This group was comprised of representatives of a number of municipalities including Mngeni, Ekurhuleni, Cape Town and Ethekewini, representatives of provincial environmental departments who work with local government around environment and sustainability issues, NGOs and the national Department of Environment Affairs and Tourism (DEAT).

In one activity, the workshop was divided into groups and asked to identify and list the environmental education and training needs of local government. The feedback from this activity has been summarised and organised (using codes LG-NA1, 2, 3, 4, 5, 6 & 7).

The curriculum planning and materials writing workshop for the EETDP qualification held at Umgeni Valley in Howick from 27 – 30 June 2005 was attended by a total of 17 individuals representing the five sectors in which the EETDP qualification will be offered. The participants at this workshop were selected on the basis of having both experience in curriculum and learning materials development in the field of environmental education as well as a particular focus in one of the sectors. An initial invitation to participate in the workshop was sent out to a wide audience and then, based on the selection criteria that had been circulated with the invitation, the final 17 participants were sent a document that outlined the purpose of the workshop and provided details of a preliminary curriculum framework that had been developed through the research and needs analysis workshops that took place in 2004. Participants were also asked to bring with them to the workshop, any existing materials or other resources that could contribute to the curriculum planning and writing process.

Although this four-day workshop generated a vast amount of feedback and material, I have decided to focus on the feedback from one particular activity, held on the second day, for the purposes of this study. A lengthy discussion took place during the workshop that was aimed at clarifying exactly what the purpose of the EETDP qualification is and how that purpose would shape the development of the curriculum that would need to have both generic components, relevant to all five sectors, as well as sector-specific components. It was decided to frame the purpose of the EETDP qualification in terms of a set of critical questions that learners from each sector might come to the course with. As curriculum developers, we could then identify the generic and sector-specific components and also gain a better feeling for the type of materials that would best suit the various needs as identified in the critical questions. Working in groups representing each of the five sectors, the participants at the workshop then generated a set of critical questions (see Appendix 2). The questions generated by the agricultural and the local government group are recorded and coded as AG-CQ 1 – 25 and LG-CQ 1 – 18 respectively.

3.4.2 Semi-structured interviews

I conducted two in-depth hour-long interviews for this study; one for each of the nested cases. One of the interviews took place in Johannesburg on 29 November 2005 with an environmental education practitioner in the Ekurhuleni Municipality who is given the pseudonym Jane in this study. The other interview took place in Howick on 1 December 2005 with an agricultural extension officer of the KwaZulu-Natal Department of Agriculture and Environment Affairs. At his request to remain anonymous, I have used the pseudonym David in this study.

In developing the interview schedule and deciding what questions should be asked, I followed the advice of Berg (1998) by starting with an outline that listed all the broad categories relevant to the study. This outline is the heuristic shown in figure 1.2 at the start of section 3.4. I used the same interview schedule for both of the semi-structured interviews. Of the four styles of questions suggested by Berg (1998), I used three including essential, throw-away and probing questions. Essential questions are those concerned only with the main focus of the study (*ibid*, 1998). The interview schedule contained only essential questions that focused on the three core interests of the study; epistemologies of environment and education, institutional structures and reflexivity.

Throw-away questions are used to develop a rapport between the interviewer and the interviewee and are usually used at the start of an interview (*ibid*, 1998). Rather than specifying beforehand how I should develop rapport with the interviewees by listing throw-away questions, I simply wrote a reminder to myself at the top of the interview schedule that said "Start by chatting informally about the organisation and the EE component of the interviewees work". I felt that this natural approach would be more conducive to developing rapport than going through a list of questions designed to achieve this.

Berg (1998) says that probing questions provide a way of drawing out more complete stories from the interviewee. Throughout the two interviews that I conducted, I asked a number of probing questions, aimed at encouraging the interviewees to elaborate on answers they had given to the essential questions. Examples included "you mentioned..." or "any other..." and even at times a non-committing "hmmmmm..." followed by silence would create the space for the interviewee to elaborate further.

With the permission of the interviewees, the interviews were tape-recorded allowing me to focus more on the interview and its dynamics rather than concentrating on recording the responses by hand. The

interviews have been transcribed (Appendix 3 is a copy of the local government interview transcription), broken into smaller categories and coded (agriculture interview: AG-SS1 – 40 and local government interview LG-SS1 – 38). The theoretical approach used to identify categories is explained in section 3.5.

3.4.3 Document analysis

After completing the two interviews described above, I asked the interviewees if they were able to provide me with copies of educational materials that they use in their work. My aim was to use these documents to compliment the interview data and for triangulation. An analysis of these educational materials would allow me to look out for educational orientations and methods as well as the underlying meanings attached to environmental concepts.

The interviewee from the Ekurhuleni Municipality provided a number of materials and I have analysed a brochure used by the municipality for promoting arbour week (coded as LG-DA1 – 9). I received one document from the interviewee in the KwaZulu-Natal Department of Agriculture and Environment Affairs. This is a training manual used by extension officers for the training of small-scale farmers in maize production (coded as AG-DA1 – 11). The method used to summarise, categorise and analyse these documents is discussed in the next section.

3.5 Data analysis

Initially, on setting out to conduct this research, I anticipated that it would require a grounded approach to theory building out of the case study research. Glaser and Strauss (1967:2) regard grounded theory as ‘an initial, systematic discovery of the theory from the data of social research’. Berg (1998:230, emphasis original) says that by developing inductive categories, a researcher is able to ‘link or *ground*’ the categories to the data from which they are derived. This differs from a deductive approach where a researcher uses a categorical scheme that is suggested by a theoretical perspective with the research data providing a means to assess a hypothesis (*ibid*, 1998).

Although I did not set out with any pre-determined, or *a priori*, hypothesis, I did have very clearly defined research interests that were shaped by the purpose of the study and the nature of the research question. These research interests were further developed through the literature review work, and I used the three main foci discussed in chapter two: epistemology, structure and reflexivity as three sensitising constructs to

begin organising the data into categories for analysis. Stake (1995) says that at times the patterns are known in advance, informed by the research question and this may serve as a template for analysis while at other times the patterns emerge unexpectedly from the analysis. In this research, the categories that I developed for analysis were determined by the research question and interests while at the same time, I remained open to new or unexpected categories that could have emerged from the data.

Freeman and Richards (1996) cited in Lawrence (1994:9) present four categories of data analysis that they present as a continuum with '*a priori*' research categories on one end and 'grounded' research categories on the other. Moving from grounded categories towards *a priori* categories, they introduce 'negotiated categories' as developed by the researcher and the researched 'through participatory, and usually iterative, analysis of the data' (*ibid*, 1994:9). Situated between negotiated categories and *a priori* categories on their continuum, they (*ibid*, 1994:9) introduce 'guided categories' of data analysis that emerge from *a priori* knowledge and experience but also 'respond to what the researcher finds in the data'. This guided analysis is the approach that I have used for data analysis in this study where I have developed *a priori* categories and subsequent analysis is guided and the categories are modified through interaction with the data (*ibid*, 1994). The *a priori* categories that I developed based on my research question are now presented with a discussion aimed at providing a rationale for each category.

Analytic categories 1 & 2: epistemology (education and environment)

My interest in epistemology, the way that environment and education are understood and what types of knowledge are seen as valid, emerged from the earlier needs analysis research for the EETDP qualification that I conducted in 2004. Through this research, I became aware that concepts such as environment and what constituted an environmental issue was understood differently in different sectors. Practitioners in different sectors seemed to understand environmental issues primarily from the perspective of their expertise and in relation to the institutional structures and activities of their sector. For example, environmental education practitioners in the conservation sector understood environmental issues primarily from a biophysical perspective as problems related to disruptions in the ecological functioning of ecosystems and loss of biodiversity (Wigley & Olvitt, 2005). Environmental education practitioners in the local government sector seemed to understand environmental issues in terms of management systems related to, for example, human activities such as waste management and land-use planning (*ibid*, 2005). This insight has implications for the development of the curriculum for the EETDP qualification that will be offered in five different sectors and led to my interest in probing these epistemologies further in this study (see also section 2.5).

Analytic categories 3 & 4: structure and agency

My interest in institutional structures, both internally within organisations and broader social structures, was influenced in part by the purpose of the EETDP qualification that 'people qualified at this level will be able to make a meaningful contribution to *environmental change through education*' (SAQA, 2005:2, my emphasis). It is important to note that the EETDP qualification is an adult professional development workplace-based qualification, and so the learners are adult professionals with certain levels of autonomy and responsibility in their work context. I realised that addressing the purpose of 'environmental change through education' in the development of the curriculum for the EETDP qualification would require an in-depth understanding of the structural factors that have a bearing on the scope for individual agency of the EETDP learners to instigate such change through education in their workplace (see also section 2.6).

Analytical category 5: reflexivity

My interest in reflexivity stemmed in part from the fact that the notion of reflexivity is inherent within the SAQA competency framework and the concept of 'applied competence' as discussed in section 2.7. All qualifications registered on the NQF are therefore meant to consider the development of reflexivity through learning. This research is aimed at informing curriculum development for the EETDP qualification that will enable reflexive environmental education and training processes. My interest in reflexivity was reinforced through the literature review and reading around structure and agency. Through this reading, I came to understand reflexivity as closely tied to agency as individuals reflexively deliberating (Archer, 1998) on what actions they can take through ongoing reflexive monitoring of both self and society (Archer, 2003). Lastly, reflexivity is an important consideration in the context of environmental education that is concerned with issues that are complex, contested, emerging and about which there is often insufficient knowledge as discussed in section 2.7.

3.5.1 Phases of data organisation and analysis

The phases of analysis relate simply to the sequencing of analysing activities:

Phase 1: Summarising, organising and coding the data from the workshops

In writing up the needs analysis for the EETDP qualification (Wigley & Olvitt, 2005) the feedback captured at the various workshops was taken from the workshop proceedings and flip-chart recordings and presented. For this study, I organised this data and coded it NA (for Needs Analysis) with a separate number for each concept or bullet point as much of the data was presented by participants in their report back sessions in bullet point format on flip chart paper. I have copies of all the original workshop flip-charts, proceedings and the Needs Analysis report⁴.

Phase 2: Transcribing and coding the semi-structured interviews

I transcribed the tape recordings of the semi-structured interviews with careful attention to record in detail both my questions and the responses of the interviewees. The careful attention I paid to recording this data is particularly important in the light of the interest, in this study, on epistemology or the ways in which the interviewees understand and articulate their understanding of concepts such as environment and education. After transcribing the interviews, I then coded the transcriptions SS (for semi-structured) and allocated a number for each key concept or area of discussion. I have kept the two 90 minute tapes used to record the interviews and have also re-recorded the tapes into digital format that is now stored on my computer.

Phase 3: Reading and coding the education materials from each sector

I coded the education materials used in the document analysis (coded as DA) by allocating a number for each heading or paragraph in the materials. I have kept the hard copies of these materials along with all of the other data.

The table below summarises the sources of data and the codes given to them during the organisation of the data.

⁴ It should be noted here that the data presented in this study is a more in-depth analysis and processing of the data than was presented in the original Needs Analysis report (Wigley & Olvitt, 2005). It is therefore not a repetition of what is presented in the Needs Analysis report, but a new analysis, conducted within the framework of this study.

Table 1.3 The sources of data and codes allocated during the data organisation

Research method/data source	Nested Case	Code
Workshop Needs Analysis	Agriculture	AG-NA (1-28)
	Local Government	LG-NA (1-7)
Workshop Critical Questions	Agriculture	AG-CQ (1-25)
	Local Government	LG-CQ (1-18)
Semi-structured interview	Agriculture	AG-SS (1-40)
	Local Government	LG-SS (1-38)
Document Analysis of education materials	Agriculture	AG-DA (1-11)
	Local Government	LG-DA (1-9)

3.5.2 Steps of data analysis

By steps of analysis I refer to deepening levels of analysis, including how the data from each method relate to each other, and how the data has been organised for analysis (see section 3.5.2), a process which constitutes triangulation. In this study, I can identify four distinct steps of analysis that combined to create a triangulation process through which I could identify continuities and discontinuities in the data.

The steps taken in the analysis of data for this study include:

- Step 1: Content analysis and categorising according to initial categories
- Step 2: Identifying sub-categories and presentation of the data
- Step 3: Generating and testing analytical statements
- Step 4: Interpreting and discussing the data

3.5.2.1 Step 1: content analysis and categorising

By studying the content of the data against the *a priori* categories that I had identified based on my research question, I was able to organise the data into 5 analytic categories:

- Analytic category 1: Epistemology related to education
- Analytic category 2: Epistemology related to environment
- Analytic category 3: Agency
- Analytic category 4: Structure
- Analytic category 5: Reflexivity

Using 5 different coloured highlighter pens, I then highlighted key concepts in the data as a way of summarising the data before adding it to its category. I maintained a column for data codes so that the link to the source of the data was not lost.

3.5.2.2 Step 2: identification of sub-categories and presentation of the data

I then studied each category of data and organised it into sub-categories that emerged from the data. This was the most time-consuming part of the data analysis as even in its summarised and categorised form, I was dealing with 22 pages of data. The identification of sub-categories also required discipline in that some of the categories were fairly obvious and directly related to the research interests whereas others only became apparent by setting aside the research question and looking at the data in a neutral manner to determine if there were any patterns emerging from it (see extract in Appendix 4). The analytic categories and sub-categories are summarised in table 1.4 below.

Table 1.4 The categories and subcategories of data

Analytic Categories	Sub-categories
1. Epistemology/ways of knowing related to education	Orientation to/purpose of education
	Context
	Role of Educator
	Role of Learners
	Role of content/knowledge/materials
2. Epistemology/ways of knowing related to environment	Understanding of environment & sustainability
	Environmental issues/risks
	Causes of environmental issues
	Solutions to environmental issues
	Legislation related to environment
3. Agency	Environmental ethics/ethical orientation
	Education/knowledge
	Environment/ethics
	Skills/capacity
	Resources/power/participation
4. Structure	Motivation/choice/free will
	Education/knowledge
	Environment/ethics/sustainability
	Skills/capacity/practice
5. Reflexivity	Resources/power/participation
	Education
	Practice

In chapter four, I provide a narrative account of the data generated in each of the agricultural and local government nested cases. Wengraf (2001) quoting Bruner (1986) discusses two modes of cognition and understanding; the paradigmatic and the narrative. Paradigmatic knowledge involves recognition of the category or concept of which something is an instance, while narrative knowledge involves understanding something in terms of how it interacts with other parts in contributing to a whole (*ibid*, 2001). Narrative understanding 'requires the to and fro movement from part to whole to part, described by the term *hermeneutic circle*' (*ibid*, 2001:315, emphasis original). Wengraf (2001:317) argues that all accounts (narratives) contain concepts (paradigmatic knowledge) embedded in them; he suggests three 'forms of knowledge-communicating' about the raw data that are each linked to the form of the data (figure 1.3). He (*ibid*, 2001) suggests that while the shaded boxes (see figure 1.3) are the most obvious form to use for the corresponding form of data; the writing or re-presentation of the data will probably involve a combination of all three forms of knowledge-communicating.

Form of the raw interview data	Form of knowledge-communicating report about those raw materials		
	Paradigmatic propositions	In-sequence diachronic (narrated-story)	Synchronic (spatial-visual)
Theorising argumentation and value-expression/ evaluation			
Narratives, reports as in an account of a sequence of events or historical process			
Descriptions as in an ethnographic account of the patterns of habitual practice of a community or individual case			

Figure 1.3 Reporting research: narrative and non-narrative (adapted from Wengraf, 2001:317)

Wengraf (2001) also cautions against 'homogenising' the language when representing the data, in other words he stresses the importance of keeping the voice of the data distinct from the voice of the researcher. He suggests a zig-zag motion between the description and arguments of the researcher and the raw data.

In chapter four, I present the data generated in the two nested cases in the context of the broader case of the EETDP qualification. In terms of Wengraf's model (figure 1.3) the data in this study falls under the third form or 'an account of the patterns of habitual practice of a community or individual case'. In reporting on the data in chapter four, I have drawn on all three forms of knowledge/communicating in Wengraf's model. The first step of analysis described in 3.5.2.1 above where I have organised the data into analytic categories based on my *a priori* research interests is a paradigmatic form of knowledge/communicating the data. The

process I went through of analysing the data and categorising it involved recognising what category or concept the data was an instance of and in re-presenting it in these categories. In chapter four, I have also included extensive quotes directly from the raw data so that there is sufficient information for the reader to judge the conclusions and recommendations that I make in the following chapters. This also allows the voice of the data to remain distinct from my own voice. The data is presented in a narrative form both 'in-sequence' in terms of the sequence of data collection and analysis and in terms of historical or contextual elements of the data.

3.5.2.3 Step 3: generating and testing analytical statements

According to Bassey (1999), a useful way of handling and making sense of data is to try to condense the data into meaningful statements or what he calls analytical statements. He suggests that these statements need to be firmly based on the raw data and that links to the data through coding is essential to enable one to go back and verify the statements. In chapter five I have generated analytic statements that draw on the data and form the basis for the interpretation and discussion of the data.

3.5.2.4 Step 4: interpretation and discussion of data

In this step of data analysis the questions of 'how' and 'why' are answered in relation to the analytical statements and the research questions (Bassey, 1999:71). This layer of analysis is presented in chapter five along with the analytical statements where the data is interpreted and in chapter six where recommendations are made.

3.6 Trustworthiness and ethics

Bassey (1999) draws on the idea of trustworthiness that he has adapted from Lincoln and Guba (1985, cited in Bassey 1999). The trustworthiness of case study research is determined by a number of factors at various stages in the research process including the collection of data, analysis of raw data, interpretation of analytical statements and the reporting of the research (Bassey, 1999). Bassey (1999:75) provides a checklist for each of these stages with questions such as 'has there been prolonged engagement with the data sources?' during the data collection stage or 'has there been sufficient triangulation of raw data leading to analytical statements?' I have used methodological triangulation in this research by using multiple data-generation techniques, including workshops, semi-structured interviews and document analysis. Multiple

sources of data have been drawn on within these methods including data from EETDP needs analysis workshops, EETDP curriculum development workshops and education materials. I have also triangulated the data through the steps of analysis (section 3.5.2) that involved a content analysis to identify categories, the further elaboration of the categories into sub-categories and the development of analytical statements that were then tested or verified against the raw data. This involved an iterative process (Huberman & Miles, 1994) of 'careful reading and re-reading' of the data, forming draft analytical statements and then carefully testing the statements against the data (Bassey, 1999:70).

Bassey (1999) recommends an adequate audit trail to enhance trustworthiness during the interpretation and reporting stages. I have developed a detailed audit trail through coding where links are made to the data source and specific location within that source. This allows the reader to access the raw data, examples of which have been appended to this report. Further, in the discussion of findings and recommendations in chapters five and six, I have provided links to the relevant sections in chapter four where the data is presented.

Bassey (1999) also provides a useful framework for ethical considerations in case study research. This has been used to guide this research and includes a range of guiding questions and principles such as the idea of respect for persons, including permission to conduct the research. In this research, including the curriculum workshops and the semi-structured interviews, I explained clearly to the various role-players that their contributions would be used for this research. The two interviewees provided education materials for analysis knowing that these materials would be used as data in the research. Although Cohen *et al* (1994) recommend that anonymity is not advisable for case studies, at the request of the interviewees, I have kept their identities anonymous by using pseudonyms. However, because of the need to gain deep understandings and insights into very specific contextual aspects of the two nested cases, I have, with their permission, provided the details of the workplaces of the two interviewees that does not give away their identity.

Bassey (1999) also recommends respect for truth as an ethical consideration in research. In this research, I have heeded this through presenting the data, in chapter four, in detail with large extracts of raw data. This allows the reader to draw their own conclusions and make judgements about the truthfulness of the findings and conclusions that I have drawn.

3.7 Conclusion

In this chapter, I have provided a detailed discussion and rationale for the research orientation as a qualitative interpretive study. The choice of a case study approach was explained and the use of nested cases within the broader context of the EETDP qualification was discussed. I have given a detailed overview of the methodology, including the methods used for data generation and analysis. Finally, I have provided a brief discussion on how issues of trustworthiness and ethics have been dealt with in the study. In the next chapter, I present the research findings in a narrative format that is structured by the analytical categories that were used to organise and analyse the data. I have drawn on and included many extracts from the raw data, and provide very little comment or discussion of the data. The interpretation and discussion of the findings is dealt with in chapter five.

Chapter 4 Epistemology, agency and reflexivity in two EETDP contexts

4.1 Introduction

In section 3.5.2.1 I described how the data was organised into analytical categories and, in section 3.5.2.2, I provided a detailed methodological discussion of how the data has been analysed and presented. The large number of categories and sub-categories in which the data is presented, each drawing from the different methods, may be difficult to follow in the narrative form that it is presented in here. I have provided a map of this chapter in table 1.5 below to assist the reader in navigating the data presentation that follows.

A brief reminder of the three methods of data generation (see section 3.3) is repeated here:

- Curriculum workshops – The EETDP curriculum development workshops engaged a range of stakeholders in each of the nested cases in identifying the environmental education needs that the EETDP qualification should address and made recommendations for the curriculum development.
- Semi-structured interviews – An in-depth semi-structured interview was held with an environmental education practitioner in each of the nested cases (see appendix 3).
- Document analysis – An education material from each of the nested cases was analysed (see appendices 5 and 6)

Table 1.5 Outline of the headings of chapter four based on the categories and sub-categories for both the nested cases.

Sources of data (all three are used in each category and most sub-categories)	The two nested cases	Categories	Sub-categories
Curriculum workshops and Semi-structured interviews and Document analysis of education materials	4.2 Agricultural sector	4.2.1 & 4.3.1 Epistemology/knowledge related to education	4.2.1.1 & 4.3.1.1 Orientation to/purpose of education
			4.2.1.2 & 4.3.1.2 Context
			4.2.1.3 & 4.3.1.3 Role of the educator
			4.2.1.4 & 4.3.1.4 Role of the learners
			4.2.1.5 & 4.3.1.5 Role of content/knowledge
		4.2.2 & 4.3.2 Epistemology/knowledge related to environment	4.2.2.1 & 4.3.2.1 Understanding of environment & sustainability
			4.2.2.2 & 4.3.2.2 Environmental issues/risks
			4.2.2.3 & 4.3.2.3 Causes of environmental issues
			4.2.2.4 & 4.3.2.4 Solutions to environmental issues
			4.2.2.5 & 4.3.2.5 Environmental legislation
	4.3 Local government sector	4.2.3 & 4.3.3 Agency	4.2.2.6 & 4.3.2.6 Environmental ethics
			4.2.3.1 & 4.3.3.1 Education/knowledge
			4.2.3.2 & 4.3.3.2 Environmental ethics
			4.2.3.3 & 4.3.3.3 Skills/capacity
			4.2.3.4 & 4.3.3.4 Resources/power/participation
			4.2.3.5 & 4.3.3.5 Motivation/choice/free will
		4.2.4 & 4.3.4 Structure	4.2.4.1 & 4.3.4.1 Education/knowledge
			4.2.4.2 & 4.3.4.2 Environment/ethics/sustainability
			4.2.4.3 & 4.3.4.3 Skills/capacity/practice
			4.2.4.4 & 4.3.4.4 Resources/power/participation
		4.2.5 & 4.3.5 Reflexivity	4.2.5.1 & 4.3.5.1 Reflexivity in education
			4.2.5.2 & 4.3.5.2 Reflexivity in practice

4.2 A nested-case: the agricultural sector

The data is presented in a narrative (see section 3.5.2.2) that is organised around the five analytical categories:

- Epistemology/knowledge related to education
- Epistemology/knowledge related to environment
- Agency
- Structure
- Reflexivity

4.2.1 Epistemology/knowledge related to education

The way that education and environmental education are understood and practised in the agricultural sector is one of the key interests of this study. After carefully studying the data using research methods outlined in section 3.3, I organised the relevant data into a category of 'Epistemology/knowledge related to education'. I carefully studied this category and was able to identify five sub-categories that emerged:

- Orientation to/purpose of education,
- Context,
- Role of the educator,
- Role of the learners,
- Role of content/knowledge/materials.

I now present the data within the framework of these five conceptual or paradigmatic categories but within these categories, provide a narrative that pays attention to historical and contextual aspects of the data.

4.2.1.1 Orientation to/purpose of education

Curriculum Workshops

The data from the workshops is interesting in that much of it is un-contextualised. A possible reason for this is that it was generated in a workshop process that included a broad range of participants who were asked

to identify environmental education needs for the agricultural sector as a whole and it can be assumed that in the summarising and presentation of each group's inputs, the context has been removed and only the core concepts remain. What has emerged through the curriculum workshop data is a concern that the EETDP qualification should pay attention to "education and training theory" (AG-NA6) including "approaches and orientations to education" (AG-CQ8) and "the role of education in the agricultural sector" (AG-CQ4). There is also a concern for considering "the effectiveness of education and understanding the reasons for this" (AG-CQ6).

For example, two of the critical questions developed by the agricultural group in the curriculum development workshop for the EETDP qualification were:

Are the education processes effective in your context? Why? Why not? What are the main challenges? (AG-CQ6) and; What might be the most useful approaches to education in your context? (AG-CQ8)

Semi-structured interview

David, as an agricultural extension officer, did not see himself as an educator though did agree that much of the extension work he engages in is educational in nature. Asked about the type of training that he does in terms of sustainable agriculture, he replied:

Just an informal training...there are modules designed with pictures, because we understand that some of them [farmers/learners] are illiterate. We train them mostly on a practical in fact, not theory...we have to say something and do it at the same time ... (AG-SS10)

Later on, when asked to describe the purpose of education and training for sustainable agriculture he replied:

... so farmers there, they must be able to stand on their own...so now that's why we like train them so that when we are away, they continue... we have to equip them and ensure...they don't just wait for the extension officer to come before they plant. (AH-SS29)

The implied purpose of education here is one of developing action-competence so that the learners are able to continue on their own even after the departure of the extension staff. This would also explain the focus on a practical rather than theoretical approach. However, what cannot be determined from these interview transcripts is the orientation to education in terms of the authority or validity of knowledge in the education process. However, an analysis of the education materials provided by David gives some useful insights into this.

Document analysis of education materials

The material that David provided for document analysis is a module used in his extension work entitled “Maize Production by Small-Scale Farmers” and is official material of the KwaZulu Natal Department of Agriculture and Environment Affairs, with the logo on the front cover. At first glance the material seems to indicate a participatory and co-constructive approach to education. For example, in a section headed “Land Preparation” there is a picture of a farmer and an extension officer both holding a document that they are discussing with the words “The technician and the farmer need to discuss farmer’s needs for maize production” (AG-DA2). Just below this is a picture of the technician and farmer walking out to towards a piece of land and the words “Technician and farmer to measure and number the land” (AG-DA2). The participation by the farmer is at a practical level in terms of providing the technician with information such as how much land he has for planting and so on. The next few lines provide more insight into the orientation to education where there are pictures of an auger and a clipboard with the words “Technician must determine effective soil depth, record measurements and production practices of previous season.” (AG-DA2). The next diagram is an instruction to the farmer to “Take soil samples ... mix, fill in form and send to Cedara with payment” and then “Wait for soil analysis and fertilizer recommendations.” (AG-DA3). Just below this is a diagram of an extension officer standing with a poster and lecturing to a group of farmers who are seated in rows with the caption “After receiving results from Cedara, technician to talk on maize production, give advice on lime, fertilizer and seed needed” (AG-DA3).

The early impression of participation and co-construction is no longer plausible as the technician (and those who analyse the soil samples at Cedara) are in authority and feed back instructions to the farmer on what actions he/she must take based on the soil samples. The technical agricultural knowledge of the technician has a place of authority in the materials which the learners (farmers) are expected to follow in the step by step guidelines provided in the materials.

4.2.1.2 Context

Curriculum workshops

There is a concern for context implicit in many of the critical questions and feedback from the needs analysis workshops. For example, a need was identified to contextualise education through, for example, choice of communication methods and demonstrations (AG-NA6). There is also a concern for both global and local influences on education, for example, some of the critical questions ask:

What global environmental principles have been developed? How can these support your work in context? (AG-CQ9) and; What might be the most useful approaches to education in your context? (AG-CQ8)

Semi-structured interview

Although no explicit references to context emerged from the interview, there were many instances when a concern with context in relation to education and training was implied. For example, when asked whether he considers some of his work to be educational, David responded:

Ja, we also do that one ... like the time we are training them [in the field] ... and there are training courses they undergo as well [by external providers] ... when they come back we make sure they implement what they learnt. (AG-SS21)

David thus sees his role as one of supporting the learners back in their operating context and supporting the putting into practice of things they have learnt on their training courses.

Document analysis of education materials

The module on maize production pays fairly superficial attention to context, mostly in the form of a listed set of alternatives for various situations. For example, in the section on fertilization, the farmer is offered choices in how he applies fertilizer: "If farmer does not want to apply fertilizer in planting furrows or with a planter, broadcast the fertilizer." (AG-DA4). Another example, in the section on harvesting: "The month of harvesting will be determined by the type of maize: open-pollinated or hybrid" (AG-DA9). The concern with context in the materials seems to focus on dealing with variations in context and the implication of these for pre-determined outcomes – the application of fertilizer or the type of seed that should be planted. For example, although it is implied that the farmer can choose open-pollinated or hybrid seed (AG-DA9) in the earlier section on planting, the farmer is recommended to "use hybrid seed when using purchased fertilizer" (AG-DA5) and when one turns back to the previous section on fertilization, the farmer is told to buy fertilizer according to the recommendations made by Cedara based on the soil samples he or she sent in. So context is not really dealt with in a meaningful sense in that the materials do not address the situation, for example, of a farmer with access to large amounts of compost or cattle manure.

4.2.1.3 Role of the educator

Curriculum workshops

Some of the critical questions developed in the curriculum development workshop reflect a concern that attention be paid to the role of the educator in the development of the curriculum for EETDP qualification in

the agricultural sector. For example: “Why do people become educators generally? Expert? Mediator? Facilitator?” (AG-CQ23) implies a need to consider the role of the educator.

Semi-structured interview

During the interview, David provided clear indications of his view on the role of the educator. Asked to explain how he saw the role of the educator in education and training he replied:

To ensure that the message you are conveying is being like attracted by those people, you don't have to talk and talks and talk and at the end of the day they haven't grasped anything, you must ensure they have grabbed all that you have been saying (AG-SS23).

Implicit in this response is a view of the educator as the expert who has the right technical knowledge that must be conveyed to the learners. He feels that it is important that the educator knows his topic: “that is important [that the educator has good knowledge]...you don't just take anyone and tell him you go and teach those people” (AG-SS23). David suggested many different ways of how the educator can be responsive to the learners within this perspective of educator as expert such as “you must first understand them and then what their level of education...so you know which language to use...” (AG-SS22) and “if the learners are wrong, you must correct them” (AG-SS23) and “some people have already undergone some training so you must be aware of that, you must be careful when you are answering questions or they will get you, they will say you are wrong” (AG-SS25).

David's approach to teaching does have a role for active learners, for example he says “ ... in the classroom or in the field ... you must let them think, you must have a little play that you can let them do ... you must give them a topic, they wont give you a topic” (AG-SS27) and “sometimes they are shy to talk in front of you so you let them feel free, do something that is not related so now when they are laughing they are free, then you can start ...” (AG-SS27).

Document analysis of education materials

The role of the technician or extension officer is predominantly that of the expert who conducts some activities with the participation of the farmer/learner but mostly conducts the analysis and makes recommendations that the farmer/learner is expected to follow. For example “technician to determine soil depth, record measurements” (AG-DA2) and “Suitable varieties of cultivars to be recommended by technician” (AG-DA6) and “apply herbicide with a knap-sack or tractor sprayer on same day as planting – ask for assistance from technician” (AG-DA8).

4.2.1.4 Role of the learners

Curriculum workshops

The role of the learner was not highlighted in this data other than a concern for education support for participation and the activities of the learners (AG-CQ3) and the provision of learning support materials (AG-NA6).

Semi-structured interview

David explained how the extension services are needs-driven and respond to the needs of the farmers/learners. For example, he feels that

commercial farmers are more established, they are more focused. You can give them the module and they can see it with themselves, you don't have to go there and train them in fact (AG-SS11) and;
... because we are needs driven in fact, we don't like to impose things on the farmers, we need to hear from them what it is that they want and we assist them along those lines (AG-SS18).

When asked specifically about the role of learners in the education process, David replied that

It must be a participatory process...you give them work to do like some topic that they have to discuss, maybe five minutes, and then they report back so you see if they understand ... (AG-SS24).

Asked why he thought that participation was important in the education process, David responded "for their sake they are not bored because once they get bored then they won't understand what you are saying...so it's better if they exchange their ideas" (AG-SS26). This take on participation is congruent with David's view of the educator as expert and the role of participation being to optimise the level of engagement with what the educator is saying rather than participation that opens up the education process to the learners' experience, context and knowledge inputs.

Document analysis of education materials

The learner has mostly a passive role implied in the materials for the module of maize production. The materials are mainly a set of instructions that the learner/farmer is expected to follow, sometimes with the involvement of the technician: "technician and farmer to number and measure the land" (AG-DA2) and "take soil samples and send to Cedara with payment" (AG-DA3) and "investigate to ensure seeds are planted properly, planting is the most important activity, do it properly" (AG-DA6).

4.2.1.5 Role of content/knowledge/materials

Curriculum workshops

Two concerns are raised through the data from the curriculum workshops, the first being that the EETDP qualification support the use of education and training materials (AG-NA6). The second concern is with how education helps to address environmental and ethical issues (AG-CQ25).

Semi-structured interview

There is a concern with the applicability or use of knowledge in practice that comes out of the interview. For example:

We train them mostly on a practical in fact, not a theory ... we have to say something and do it at the same time ... we must train them whilst the things are here and we just finish the training and get into the practical (AG-SS10).

Later on in the interview David says "... we must ensure that there is something for them to grow, if you are training them on cabbage production there must be equipment" (AG-SS28). The role of knowledge or content in the education process is seen as that of supporting and enabling practice. In light of this, the content of education and training tends to focus on specific areas of discipline within agriculture such as crop production, poultry, hydroponics and so on:

... we also undergo crop production courses to refresh ourselves ... vegetable production, poultry, livestock production, hydroponics, all those kinds of courses (AG-SS20).

The content is also varied according to the perceived level of autonomy or competence of the learner groups. So for example, with small-scale emerging farmers, the technician conducts the soil tests while with commercial farmers:

We train them on soil testing, taking of soil samples, we use some specific measures to test the soil, ja, that's what we can train the commercial farmers (AG-SS11).

Document analysis of education materials

As a whole, the material for the module on maize production is effectively an instruction manual for farmers to be able to follow, step by step, the activities and procedures outlined in the material. The content draws on standard commercial agricultural practice: "disc or deep plough the land to incorporate lime and fertilizer" (AG-DA4) and "grey leaf spot: plant seed of resistant hybrids or spray with a fungicide" (AG-DA7) and "spray green growing weeds in late October using a cup of Roundup in 20L of water" (AG-DA10).

4.2.2 Epistemology/knowledge related to environment

Six sub-categories emerged from the data related to epistemology of environment. These sub-categories are:

- Understanding of environment and sustainability,
- Environmental issues/risks,
- Perceived causes of environmental issues,
- Perceived solutions to environmental issues,
- Environmental legislation, and
- Environmental ethics/ethical orientations.

4.2.2.1 Understanding of environment and sustainability

Curriculum workshops

The data from the workshops showed a concern for how the EETDP qualification deals with understandings of environment from both global and local perspectives. For example: “what are the main issues related to environment in your context? How are these issues understood locally? How are these issues being addressed?” (AG-CQ16) and “How is environment understood globally?” (AG-CQ21).

More specific examples raised through the workshops reflect understandings of environment as related to the natural or biophysical world. Examples include the need for the EETDP qualification to address “knowledge of ecological and environmental systems/principles” (AG-NA1), “critical habitats and ecological processes and patterns” (AG-NA7), “carrying capacity thresholds” (AG-NA9) and “disturbance ecology” (AG-NA11). A couple of examples also reflected recognition of social dimensions of environment including “equity issues” (AG-NA25) and “food quality issues” (AG-NA26).

Semi-structured interview

When asked what he understood by the term environment, David responded that:

Environment is everything that is available, more especially something that is grown. We can speak of the timber that we have, we can speak of vegetation, we can speak of the dams built, all those things, ja, everything that is around us. The soil is one of the things that is the environment, ja, crops ... (AG-SS1).

When asked how he had come to understand it in this way, he responded that it was through his studies; a national diploma in agriculture (AG-SS2). Later, asked to explain his understanding of sustainable agriculture, David responded:

We implement projects in the community and plant different crops ... and we ensure that that continues, it doesn't end and they produce all year round because we put irrigation, we put everything in fact, fencing, irrigation, we train them (AG-SS9). And later on: Sustainable agriculture is to ensure that what has been put is being used effectively and those people will benefit from it for a long time, ja, not something that will end, it is continuous (AG-SS13).

Asked whether he thought that conventional agriculture (mono-culture) was sustainable David felt that it was: "we don't experience much [environmental] problems [with commercial farmers] though" (AG-SS4) and

Ja it [commercial agriculture] is sustainable, we have this new system ... no-till planting where you burn the grass or weeds, you spray the soil at the first stage ... (AG-SS14).

When I asked David about his thoughts on permaculture as a form of sustainable agriculture he replied:

... you don't have fertilizers there, you don't have chemicals ... you must have training on that because the compost you use, it must be decomposed, you must know how to make compost, you must get intensive training on that and you cannot measure how much to put in but in terms of fertilizers you know that you have taken a soil sample and you have been told how much to put into the soil but you need to have more and more compost as compared to fertilizer ... (AG-SS16), and later:

... but on a large scale, you cannot use permaculture ... you got to have lots and lots of compost and kraal manure and how would you control the pests? (AG-SS19).

Several aspects are noteworthy from these interview extracts. One is that David's understanding of environment is very much grounded in his work context and related to agricultural aspects of the environment. Secondly, the understanding of sustainability reflected here is focused on the possibilities for the continued practice of agriculture while considerations of ecological sustainability, for example, are not mentioned. This understanding would also explain his firm belief that current commercial farming practice is sustainable and his use of the example of no-till method as an example of sustainable practice (in this method, the field is first sprayed with herbicide to kill all plant growth before the crop is then planted). A third observation can be made around the type of knowledge related to practice that David finds to be more valid and useful in his work and that is the scientific or technical knowledge related to soil testing with its very defined recommendations for fertilizer input. The less easily defined and measured use of organic material seems to deter him from engaging with practices such as permaculture and hence his belief that "you must get intensive training on that" (AG-SS16).

Document analysis of education materials

The materials are very focused on specific activities and procedures for farmers to follow in the production of maize and so there are no explicit references that reflect on understandings of environment. However, inferences can be made in terms of the ethical orientation towards environment, to be discussed in section 4.2.2.6 below.

4.2.2.2 Environmental issues/risks

Curriculum workshops

A range of environmental issues in the agricultural sector were raised that mostly relate to the biophysical environment including “littering” (AG-NA15), “alien vegetation” (AG-NA16), “unsustainable harvesting [of wild plants]” (AG-NA17), “uncontrolled ploughing” (AG-NA18), “hunting” (AG-NA19), “wetland destruction” (AG-NA21), “mono-cropping and erosion of biodiversity” (AG-NA23) and “genetic engineering and contamination of seed” (AG-NA24). Two environmental issues that are social in nature were raised including “equity issues” (AG-NA25) and “food quality issues” (AG-NA26).

Semi-structured interview

Asked what he thought the main environmental issues or problems in the agricultural sector are, David responded:

Foremost in the environment, we've got a problem of erosion of soil, also alien weeds, some just grow along the streams ... and we find that the dams are drying out because a lot of water is being extracted by these exotic trees ... (AG-SS3).

When pressed for more examples, David mentioned that “another problem we have, the crops that are grown are not marketed, some farmers lack markets” (AG-SS4) and then later:

I don't know whether climate falls under environment ... because in some places the climate is not the same ... the rain falls different and this creates a lot of problems ... if the rain doesn't come and you have already sown your seeds, that is a problem (AG-SS5).

Later in the interview, during a discussion on commercial farming methods, David mentioned:

... but the conventional way, we still use, but that one we believe that a lot of nutrients are being lost through that practice ... when you turn the soil, the water comes up and when the sun evaporates ... you can lose the nutrients ... (AG-SS15).

Again, environmental issues identified by David mostly reflect an understanding related to the biophysical dimension of environment though he does also see marketing and lack of markets as an environmental

issue reflecting a broader understanding that includes economic aspects. It is interesting that the issue of ploughing and nutrient loss is raised as an example of an environmental issue when earlier it was suggested that conventional practice is sustainable.

The materials analysed did not explicitly or implicitly refer to any environmental issues.

4.2.2.3 Causes of environmental issues

Semi-structured interview

During the interview, I probed to see what David thought were the underlying causes of some of the environmental issues he had raised. His response with regard the problem of soil erosion was that “like for soil erosion ... that is a problem, camps aren’t divided and animals roam around” (AG-SS6). When asked what he felt the underlying cause of people keeping many cattle and not having camps was he replied “ the culture, people like keeping cattle and goats” (AG-SS6) and then went on to describe in more detail the effects of overgrazing. Despite my probing during the interview to find out more about underlying causes, the conversation each time seemed to move quickly back to descriptions of the effects or symptoms of the problems that we were discussing.

4.2.2.4 Solutions to environmental issues

Curriculum workshops

A range of possible solutions to environmental issues were identified during the curriculum workshops including “sustainable agricultural practice, e.g. permaculture” (AG-NA3), “soil management” (AG-NA20), “wetland rehabilitation” (AG-NA21), “water conservation” (AG-NA22) and “raptor and predator conservation and management” (AG-NA28).

Semi-structured interview

According to David, the solution to environmental problems is better management and training:

... even if they weren’t able to divide the camps with fencing, but through burning they can help, they can divide the camps through that ... so they rotate, rotational grazing (AG-SS7).

Asked what role the extension officers have to play regarding solutions to environmental problems: “ja, that’s training ... is a compulsory part of extension and in ensuring that everything is done well” (AG-SS8).

With regard to the loss of nutrients caused by ploughing, David recommended the no-till method as a solution: "... you can do a demonstration, the crops which are conventionally grown will not be the same, you can see the difference" (AG-SS15). The fact that this method involves intensive application of herbicides and later, fertilizer did not seem to negate it as a more environmentally sustainable solution.

4.2.2.5 Environmental legislation

Curriculum workshops

Feedback from the workshops reflected a concern that consideration be given to guidelines provided by legislation and environmental standards for sustainable practice (AG-CQ17 & AG-NA2 & 4). A critical question also raised the issue of legal liability of farmers: "should farmers be legally liable if nutrients and poison from their farm pollutes air or water?" (AG-CQ18).

4.2.2.6 Environmental ethics/ethical orientation

Curriculum workshops

The data from the workshops reflects a concern that environmental ethics be dealt with through the EETDP qualification. Examples include:

What are the main ethical issues related to treatment of farm animals, production of healthy food, impact of activities on the natural environment and treatment of employees? (AG-CQ12)
and
Is a farmer responsible for the impacts of food production on environment and customers? (AG-CQ13)

Document analysis of education materials

An anthropocentric ethical orientation towards nature is reflected in the materials where nature is seen as a hindrance or obstacle to agricultural activities, for example: "cutworms are reduced by keeping lands weed-free before planting, if necessary apply cutworm bait directly after planting or spray a registered insecticide over the row" (AG-DA7) and "herbicides applied incorrectly will damage the maize and waste money" (AG-DA8). Nowhere in the materials is a concern for the possible impacts on the natural environment expressed.

4.2.3 Agency

One of the goals of the study is to gain insights into the institutional structures within the two nested cases. As discussed in section 2.6, agency and structure have been analysed separately in this study for analytical purposes. After a careful analysis of the data related to agency, I was able to identify five sub-categories or factors that have a bearing on agency. These are:

- Education/knowledge,
- Environment/ethics,
- Skills/capacity,
- Resources/power/participation, and
- Motivation/choice/free will.

4.2.3.1 Education/knowledge

Semi-structured interview

Education and knowledge have a bearing on individual agency of farmers as reflected in these excerpts from the interview: "... another problem we have is that crops that are grown are not marketed ... we have to try and educate them because they don't understand all those kinds of things ..." (AG-SS4) and in response to a question about the purpose of education and training for farmers: "... farmers must be able to stand on their own when we are away ... not just wait for us before they plant" (AG-SS29). The perceived role of knowledge and education here is that it enables farmers to act in intentional ways through a better understanding or knowledge related to their practice.

Education and knowledge related to David's practice is also highlighted through his comment on permaculture that this "requires intensive training" (AG-SS16), something that he reiterated a few times. Having been educated and trained in conventional agriculture (AG-SS2), David does not engage with permaculture in his own extension work, rather sending the farmers to external providers if they express an interest in it (AG-SS18). David acknowledges his lack of knowledge of permaculture and other sustainable farming techniques and at the same time does not see the conventional agriculture that he is knowledgeable in as unsustainable, partly due to his understanding of sustainability as discussed in section 4.2.2.1 above. So, in a sense, David's practice as an extension officer is shaped or influenced by his education and knowledge of conventional agriculture and his understanding of sustainability as 'sustaining farming production'.

4.2.3.2 Environment/ethics

Curriculum workshops

Agency as related to ethics emerged through some of the critical questions in the curriculum development workshop for the EETDP qualification. For example, one question asked “what is needed for farmers to become more responsible as stewards of the environment and as producers of healthy food?” (AG-CQ15). A number of similar questions posed around the role of education in dealing with environmental ethics relate to agency in the sense that ethical considerations are often not explicitly thought about by farmers in terms of their practice. And yet, looking at how agriculture is actually practised there is a whole range of implied ethical positions that farmers are operating with and that shape their practice. The critical questions raised in the workshop are suggesting that the EETDP qualification can play a role in opening up these hidden ethical assumptions or positions and make them explicit so that education plays a role in making more obvious to learners (farmers) how their actions are influenced by their ethical orientations and the implications of different ethical orientations for practice.

4.2.3.3 Skills/capacity

Curriculum workshops

A range of skills were listed as important (for environmental education practitioners) including “communication skills, writing and computer skills, administration skills and conflict resolution and negotiation” (AG-NA5). These skills have an important bearing on agency as related to the practice of an education practitioner such as an agricultural extension officer in the sense that the work of the practitioner will tend to be more random and possibly less effective without these skills. For example, articulating complex concepts around environment and sustainability will require excellent communication skills and someone who may have good ideas for change but is unable to communicate and share them through education and extension activities will not have much scope for challenging existing structures such as habits or entrenched beliefs about farming practice.

4.2.3.4 Resources/power/participation

Curriculum workshops

One of the critical questions raised is “how can we balance the short-term interests of individuals with long-term interests of the community?” (AG-CQ10) and a concern that environmental education practitioners be able to deal with “conflict resolution and negotiation” (AG-NA5). An education practitioner who aims to challenge and change unsustainable agricultural practice will need to clearly understand how the power and resources of different role-players affect the scope for change.

Semi-structured interview

“Commercial farmers are more established, they are more focused ... you don’t have to go there and train them in fact” (AG-SS11) says David when asked what sort of training for sustainable agriculture he does with commercial farmers. Commercial farmers are, in David’s mind, a powerful, well-resourced and already competent group of people and so he does not feel that they need any training, even around sustainability. This entrenched power gradient allows commercial farmers to continue their farming practices without engagement or challenges from the agricultural department extension services. This has a bearing on their (the farmers’) agency as their practice is shaped by other structures such as habit or the influences from agri-business who sell them the latest technologies and so the possibility for change based on environmental sustainability is reduced.

4.2.3.5 Motivation/choice/free will

Semi-structured interview

... We have a pile of projects that have been submitted and are waiting for funding ... and when there is no money coming, they will ask you, they will keep on asking you where is our money for this project? And how far is it going ahead? (AG-SS33).

The agricultural department and the extension officers are, from the farmers’ perspective, a structure that has a bearing on their agency. As an authority with resources and power (to determine, for example, which emerging farmers are supported with funding), the farmers will be likely to behave, wittingly or unwittingly, in ways that they feel are expected of them by the department. David is an open and engaging person who articulated clearly that he does not impose his or the department’s views on farmers in terms of their choices of farming methods:

But we also send farmers to those relevant places [that offer permaculture training] ... so we sometimes take farmers there, they feel like they want to use this method, because we are

needs driven, we don't like to impose things on the farmers, we need to hear from them what it is that they want and then we assist them along those lines ... (AG-SS19).

David then continues to say:

... but we would like them to have this method of permaculture on this side and the one, that is conventional, we are used to, so they can like compare the difference and see how is this one and how is this one and choose the one they want. But on a large scale you cannot use permaculture (AG-SS18-19).

David was very clear that he is not an expert on permaculture methods and that farmers who request this are sent to external trainers. It is likely that although he feels that he is not imposing his views on the correct methods that farmers should use, his lack of knowledge or unawareness of alternatives automatically reduces his own (and therefore the farmers') choice in terms of what support and advice he provides to farmers. His practice is therefore guided to an extent by the structures of his education, existing knowledge and beliefs and the materials that are available to him in his work (see below) in ways in which he is possibly unaware.

Document analysis of education materials

The materials that David uses, provided by his department, are unambiguous in terms of the activities that they suggest farmers practise. The materials, as has been discussed in more detail in the previous sections, provide a set of instructions that the farmer must follow with only an occasional space for choice in terms of variations that ultimately lead to the same outcome: "if farmer does not want to apply fertilizer in planting furrows or with a planter, [then] broadcast fertilizer" (AG-DA4). There is no space, in these materials, for a farmer who may have a herd of cattle or goats and therefore has ample manure, for example, to choose to use organic fertilizer instead. These materials, as a structure relating to the practice of extension officers, will have a bearing on the agency of extension staff and their level of choice in terms of the training and support they offer farmers.

4.2.4 Structure

After analysing the data related to structure, I identified four sub-categories of structure and within each of these sub-categories are both formal or visible structures and less formal and less visible structures. Structure and agency are not discussed separately here because they are seen as separate phenomena in 'real life', but are discussed separately for analytical purposes only (as discussed by Layder 1997 and Archer 1998, see section 2.6). As can be seen in the section on agency above, the discussion on agency

was not possible without referring to structural aspects and yet the focus of the discussion remained on factors that influenced agency or the extent to which the practices of the extension officer and farmers/learners are voluntary or conscious and the scope for change through education that this allows. This section looks at structure and agency from the perspective of structure, what the structures are, both formal and informal, that have a bearing or influence on the agricultural extension staff and the farmers they work with. The four sub-categories that emerged from the data are:

- Education/knowledge,
- Environment/ethics/sustainability,
- Skills/capacity/practice, and
- Resources/power/participation.

4.2.4.1 Education/knowledge

Curriculum workshops

The data from the curriculum workshops raised a number of concerns related to education structures including “global influences on educators” (AG-CQ1), “global environmental principles to support environmental education work in context” (AG-CQ9) and “global and local influences on the purpose of education” (AG-CQ24). A concern for “assessment” (AG-NA6) in the context of the accredited, workplace-based EETDP qualification was also raised. The EETDP qualification is itself part of an education structure, the NQF, as discussed in section 2.4.

Semi-structured interview

When asked about how he had come to his understanding of environment, David responded that it was through his studies “a national diploma in agriculture” (AG-SS2). Further on, when asked about professional development opportunities for extension staff, David replied

... we did the crop production course at college but we also undergo crop production courses to refresh ourselves ... vegetable production, poultry, livestock production, hydroponics ... (AG-SS20).

The content of these courses, whether or not environment and sustainability issues are dealt with and the approach or orientation to education will all have some influence on David and his work as an extension officer.

The education of the farmers/learners that David works with is also something that he considers and that influences his practice: "... in fact you must understand the farmers on the training, you must first understand them and then what their level of education so that you know which language to use, mostly if possible Zulu, their mother tongue ..." (AG-SS22). David is reflecting an awareness of both formal (level of education) and informal (language/culture) structures and their bearing on the education process.

Document analysis of education materials

As a whole, the materials are a structural component of the education and extension support that is provided by the agricultural department. The educational orientation and content of the material has been discussed at length in the previous sections. These materials are a formal structure that guides the education and extension work of David and his colleagues.

4.2.4.2 Environment/ethics/sustainability

Curriculum workshops

The data from the curriculum workshops raises a range of concerns that are related to ethics and environmentally sustainable practices, for example; "What steps should a farmer take to protect the environment? (a) legislated; (b) farmer groups and (c) individuals?" (AG-CQ17) and "What principles can guide ethical decisions? What global ethical principles are available?" (AG-CQ22). These questions reflect a concern that existing formal and informal structures that can provide guidelines for ethical and environmentally sustainable practice be identified and explored during the learning on the EETDP qualification.

More specific examples of structures that can provide guidance for and enable sustainable practice include "eco-labelling" (AG-NA13) of agricultural produce, "agribusiness, marketing and environmental standards" (AG-NA4) and "environmental legislation related to agricultural practice" (AG-NA7).

4.2.4.3 Skills/capacity/practice

Curriculum workshops

Structure-related skills that have an influence on practice include "drivers license required by extension staff" (AG-NA5), "dress code/personal appearance of staff" (AG-NA5) and "health and safety" (AG-NA14).

These are structural factors that are not directly related to environment or sustainable practice but are general professional skills or capacity required for an extension officer to be able to work effectively.

A concern was also raised that extension officers be able to “support management and conservation of critical habitats” (AG-NA7) and “help small farmers compete in market through organic certification and internal control systems” (AG-NA27). These structural factors provide opportunities or spaces for promotion of environmentally sustainable practice by extension officers and will probably require additional skills or capacity building for the extension staff to engage with them, a role that the data suggests could be played by the EETDP qualification.

Semi-structured interview

Asked about possible underlying causes of overgrazing, David replied “the culture, people like keeping cattle, goats ...” (AG-SS6). This response highlights the role of structure, in this case culture, related to practice.

The role of David’s skills and capacity, related to his education and how this influences his perception of practices such as permaculture has been discussed in section 4.2.3.1 above in relation to agency. Another example of structure raised through the interview is in response to questions about the involvement of youth in agriculture:

We got a lot of youth now engaging themselves in agriculture ... we also have now a section in our department, a youth section where we got extension officers who are dealing with youth matters and youth projects” (AG-SS32) and later:
... as long as the youth engage themselves because now our mothers are dying, so if no one is growing with these things in their heads [agricultural knowledge] then these things will die ... (AG-SS32).

The agriculture department has established a structure, a youth section, to deal with youth in agriculture. David also talks about the less visible structure of knowledge passed down from generation to generation which constitutes part of the cultural fabric of society.

4.2.4.4 Resources/power/participation

Semi-structured interview

There are many structures that play a role in determining the allocation of resources and the scope for participation and the power to act. For example, David spoke about limits to resources in his own department: “... we don’t always visit the farmers at the projects because we’ve got a lot of projects ... so I

cannot manage physically all the training even in one month ..." (AG-SS29). Sometimes the expectations of farmers on his department are unrealistic and affected by political factors:

... people have submitted their requests for projects only to find that they are told that the budget is not there, there is no money. When the minister is talking over the radio he says yes, there is money, you must apply but then they come to our offices then we say no, there is no money ... (AG-SS33).

David also refers to structural problems in the department itself:

... we don't have access to the things in our regional office, you see, only the bosses who attend meetings at the regional office, sometimes they don't report to us what they, err, the latest theory, news or issues pertaining to our work in fact ... (AG-SS34) and:
... because now when you jump, go to the regional office and then your boss; now you fight with him, he understands that there must be these levels of communication, you must not just go up there (AG-SS34).

Within his department and from other departments, David has access to resources through collaboration or participation of other role-players: "we've got scientists in our regional office who are specific to a certain commodity so we go and ask them when we have a certain question" (AG-SS36) and "we also communicate with other departments like the department of health, we communicate with education and the NGOs as well" (AG-SS37).

4.2.5 Reflexivity

I looked at the data to see if there was any evidence of reflexivity and discovered two sub-categories; one related to education and the other to practice.

4.2.5.1 Reflexivity in education

Curriculum workshops

One of the critical questions raised at the curriculum development workshop asks "what form does education take in your sector – apprenticeship (practical), classroom (theoretical)? Theory-practice/practice-theory > praxis?" (AG-CQ5) and another "Are the education processes effective in your context? Why? Why not? What are the main challenges?" (AG-CQ6). These questions suggest that reflexive skills be developed by the education practitioner: the ability to critically reflect and change one's education practices both proactively and reactively.

Semi-structured interview

There is some evidence of reflexivity in David's educational work, for example: "... that's why your programme must be like versatile because now if they have a problem ... you have to change ..." (AG-SS29). He also can draw on others when he feels that his own skills or knowledge are insufficient: "... we've got scientists in our regional office ... when we have got a certain question, so we can come to an arrangement" (AG-SS36).

4.2.5.2 Reflexivity in practice

Curriculum workshops

A concern for "evaluation" (AG-NA6) and "impact assessment, prevention and mitigation" (AG-NA12) allude to reflexivity in practice.

Semi-structured interview

Examples of reflexive practice mentioned by David include: "... even if they [farmers] weren't able to divide the camps with fencing, but through burning they can help, they can divide the camps through that ..." (AG-SS7). There is also evidence of reflexive practice that goes against the structural rules and yet seems to be necessary for David to work effectively: "because now when you just jump [over your bosses head] and go to the regional office ..." (AG-SS34). The realisation that communication or resources are not coming through the established structural channels has led David and colleagues to break with workplace procedure and even at the risk of alienating their boss, they have responded by going directly to the regional office themselves. This is not the only instance of reflexive 'rule-breaking' that David mentioned. In response to the fact that many emerging farmers do not have transport to get their crops to market, often resulting in crops rotting in the field, going against the policy of the department David says

... but sometimes we like, we don't tell the bosses that we do that, we sometimes help them but were not supposed to do that, through mutual understanding we can just help them get their crops to the market ... because we can understand the situation ... (AG-SS39).

This narrative of the agricultural nested case is drawn on and discussed further in chapter five. I now provide a narrative of the local government nested case.

4.3 A nested-case: the local government sector

The same categories and sub-categories are used in the local government nested case as those that were used in the agriculture nested case above (see section 4.1).

4.3.1 Epistemology/knowledge related to education

The data for both the agricultural and local government sectors was analysed together so that the sub-categories for the local government nested case are the same as those for the agricultural case:

- Orientation to/purpose of education,
- Context,
- Role of the educator,
- Role of the learner, and
- Role of content/knowledge/materials.

4.3.1.1 Orientation to/purpose of education

Curriculum workshops

A concern, during the workshops, for the “appropriateness of community education strategies” (LG-NA6) reflects that a consideration of education orientations or methodology be taken into account by EETDP qualification learners.

Semi-structured interview

Jane (see section 3.4.2) sees the purpose of environmental education as being to change mindsets or create awareness in order to change practice: “what can be done is that around the mindsets of the people, through environmental education we can change, try and promote recycling issues” (LG-SS14). She also sees a strong role for environmental management, for example, when asked to explain what she saw as the broad purpose of environmental education, Jane responded:

That is to make people aware of what environmental management is, when we talk about environmental management, what is it that we are talking about? Are we talking only about parks or waste, things like that? We want them to be with us on that, to know what the concept is all about and make them start practising and through environmental management and behaviour and get them to change their mindsets so they start behaving as environmentalists (LG-SS20).

Jane does not see this necessarily as a one way, top-down process of education where experts provide the knowledge or awareness through environmental education:

... without them [participation by communities] there is nothing you can do. You can go there and implement a programme that you did on your own in your office and at the end of the day you wont have an impact, it is going to go down (LG-SS22).

Jane feels it is important that environmental education is formalised in local government: "... environmental education has been done over and over again but what we want to do now is sort of formalise it ... get accredited and get recognised programmes" (LG-SS21).

Document analysis of education material

The material analysed is a brochure developed to promote Arbour Week. The brochure explains the purpose of celebrating Arbour Day and provides insights into the perceived purpose or orientation to education by those who developed the brochure: "its purpose is to encourage people to become active supporters of sustainable and equitable living, by involving communities in environmental greening activities ..." (LG-DA5).

4.3.1.2 Context

Curriculum workshops

The data from the curriculum workshops reflected a concern for context in education processes. This included "public perception/understanding of environmental education" (LG-CQ2), "municipalities' perception of the role and style of environmental education" (LG-CQ6) and "changing contexts regionally and nationally" (LG-CQ10). A concern for "consultation of and participation by communities" (LG-NA6) and "knowing learner groups" (LG-NA7) reflect a need for context to be considered in environmental education processes in local government.

Semi-structured interview

Although not explicitly referring to context and a consideration of context in the interview, Jane did give examples of different contexts in which environmental education takes place in her municipality including "training and capacity building of local government employees, for example, on recycling" (LG-SS17), "environmental education initiatives with community members such as environmental forum members,

NGOs, rural communities, ward committees and schools" (LG-SS19). Some of the activities they engage in include "environmental education lessons at environmental education centres for schools and community members and field trips to nature reserves, weather station and water management centre" (LG-SS19).

Asked specifically about the role of the EETDP learnership, that her municipality will be participating with five learners in 2006, Jane responded that for their three unemployed learners who would be selected from the community "you don't want someone who is not really interested in environmental issues ... there are those that did conservation but then did not complete their studies ... people like that are people we will consider" (LG-SS38). With regard to internal employees who will do the learnership they have one candidate who has an environmental management background and has been selected to do the EETDP learnership because "... based in the environmental education section, she will need to have more knowledge about environmental education" (LG-SS38). Their second candidate is an ex-teacher and has been selected because "... she was a teacher so she needs more on the environmental side" (LG-SS38).

4.3.1.3 Role of the educator

Curriculum workshops

The workshop participants expect educators to be responsive to the context and the learners by being able to "identify and respond to contradictions or ethical dilemmas in their work" (LG-CQ10). This implies that the educator's role is not one of delivering pre-determined messages/knowledge/content to the learners but one of being reflexive and able to respond to complex situations that arise in the education process.

Semi-structured interview

Jane's view of the role of the educator is one of enabling participation:

... it goes back to environmental education and public consultation ... we are trying to get the communities to participate in the EIA processes ... we get them to participate and add their views (LG-SS16).

The role of the educator is also to provide knowledge or information about the environment but at the same time to invite participation during educational activities:

... we inform the community what wetlands are and how we as a community benefit from them and that is a sort of participatory workshop; they are telling us what they think could be the solution with regard to the maintenance of the wetland and how they utilise the wetlands ... (LG-SS25).

4.3.1.4 Role of the learner

Curriculum workshops

A concern for learners to be consulted and participate in education is evident, for example in the needs analysis workshop, participants identified the need for “community participation processes; consultative processes – how to bring communities on board” (LG-NA6).

Semi-structured interview

Again, the role of learners to participate and contribute to learning is evident in many of Jane’s responses in the interview: “... we try to get the communities to participate ... and add their views” (LG-SS16) and “... like when we did our air quality management plan, we actually workshoped it with them ...” (LG-SS22) and “... the training is actually their [communities/learners] responsibility, to give their problems and get solutions to these problems” (LG-SS27).

There is a slight contradiction in terms of the actual practice that Jane describes and her explanation of the purpose of environmental education:

... to make people aware of what environmental management is ... make them start practicing and through environmental management and behaviour and get them to change their mindsets so they start behaving as environmentalists (LG-SS20).

4.3.1.5 Role of content/knowledge/materials

Curriculum workshops

Some of the content recommended by this data is for the implications of policies and principles such as “Agenda 21 and Tbilisi Principles” (LG-CQ11) to be considered in environmental education in local government. There is also a concern for the “critical selection of information and materials” (LG-CQ17) and the “appropriateness of learning materials” (LG-NA7).

Semi-structured interview

Content covered during existing environmental education initiatives described by Jane include “field trips to nature reserves, weather station and the water management centre” (LG-SS19). In many responses, Jane referred to the need for people to understand environmental management, for example: “... to help the

community, in the workplace and the general community, to start to practise environmental management ...” (LG-SS28). A more specific example of this is the air quality management plan that was developed and “... workshopped with communities so that they know their responsibilities ...” (LG-SS22).

Regarding the EETDP qualification, Jane saw its role as developing educational skills for an employee who has an environmental management background and environmental knowledge for an employee with a teaching background (LG-SS38).

Document analysis of education material

The brochure for Arbour Day is an A5 leaflet that seems to have two main purposes. The first is to explain the purpose of Arbour Day and encourage active participation by communities (see section 4.3.1.1). The majority of the brochure is a list of facts about indigenous trees and the benefits of trees to people and nature such as “beautify the environment, offer habitat for many animals, provide food ...” (LG-DA8).

4.3.2 Epistemology/knowledge related to environment

Six sub-categories of data related to epistemologies of environment, or ways that knowledge about environment are created and validated in the local government nested case. These are:

- Understanding of environment and sustainability,
- Environmental issues and risks,
- Perceived causes of environmental issues,
- Perceived solutions to environmental issues,
- Legislation related to environment, and
- Environmental ethics.

4.3.2.1 Understanding of environment and sustainability

Curriculum workshops

Data that reflected understandings of environment and sustainability included “understanding population and natural resources: socio-ecological balance” (LG-CQ12), “understanding the relationship between natural environment and economic development” (LG-CQ13) and “understandings of environmental

pollution" (LG-NA5). What this data reflects is a recognition that environment is complex and involves many dimensions including the natural environment, social and economic aspects.

Semi-structured interview

Jane described environment as "... ecosystems, different species, plants, animals ..." (LG-SS2) and said that she had come to understand it this way through her studies in environmental health (LG-SS3). This response initially seems to indicate an understanding of environment as related to nature or biophysical aspects and yet when asked to identify environmental issues, Jane's responses reflected a far broader understanding of environment (see section 4.3.2.2 below).

Document analysis of education material

The material selected for analysis may give a biased impression of the understanding of environment as the material is specifically designed for Arbour Day that automatically has a focus on a natural or biophysical dimension of environment. However, useful insights into how environment is understood are evident in the material. In this material, environment is generally seen as nature in service of people: "many indigenous plants contain unique properties. Some can be used to develop specialised drugs which have saved lives" (LG-DA7). There is a large section headed "What do trees do for nature (and people)?" (LG-DA8) where a range of items are listed, some relating to how trees benefit people and others to the role of trees in natural processes, for example: "act as wind breaker and noise barriers in cities, counteract the greenhouse effect, release water vapour as part of the water cycle and enrich the soil ..." (LG-DA8).

4.3.2.2 Environmental issues/risks

Semi-structured interview

Jane was asked about the main environmental issues in her work context and responded that "... we have the problem of waste because historically there were riots and some sort of protests against the municipalities and in the townships most of the services were stopped ..." (LG-SS4). The impacts of the problem of waste are "mostly its unsightliness but then with regard to health [it has] health implications ... but there isn't as much environmental impact" (LG-SS5). Jane's response at first indicates a broad understanding of environment as including social/health dimensions but she then contradicts this by saying that there are not really any environmental impacts of waste, or it would seem she means "biophysical" impacts. Other environmental issues listed by Jane include "air pollution from industry ... and dust from mine dumps" (LG-SS8) and "... some water pollution" (LG-SS9).

Document analysis of education material

The materials provide the information that “when indigenous plants become extinct, they are lost forever” (LG-DA7) and a number of environmental issues are alluded to in the list of benefits that trees provide to nature and people: “wind and noise barrier in cities ... counteract the greenhouse effect ... prevent soil erosion” (LG-DA8).

4.3.2.3 Causes of environmental issues

Semi-structured interview

Jane refers to historical factors that underlie the issue of waste: “before then [apartheid] we didn't have waste in our yards, our open spaces were clean but after that you find tension between communities and municipalities” (LG-SS6). She sees the cause of air pollution as “... there is still a lot of coal being used as a source of [domestic] energy” (LG-SS10) which is compounded by the fact that “there is no infrastructure for electricity in some areas” (LG-SS11). The underlying cause of air pollution is also “they [factories] cause air pollution too ...” (LG-SS12) and “... some of the mines close and they are not rehabilitated” (LG-SS12). Linked to this problem is the fact that there are different departments responsible for enforcement of legislation: “... this is under the hands of the department of mineral affairs and energy” (LG-SS13) and “... there is the new air quality bill, who is the institution responsible for the enforcement of that, I am not too sure” (LG-SS15).

4.3.2.4 Solutions to environmental issues

Curriculum workshops

There is a concern for participation in the solution of problems: “relationships with key stakeholders” (LG-CQ7). The role of better management practices is also raised: “need for sustainable waste management e.g. recycling” (LG-NA1) and “management of biodiversity” (LG-NA4).

Semi-structured interview

Jane also sees an important role for better environmental management in solving environmental problems and sees environmental education as a means of achieving improved environmental management:

... [environmental education] is to make people aware of what environmental management is ... to know what the concept is all about and to make them start practicing and through environmental management and behaviour, get them to change their mindsets so they start behaving as environmentalists (LG-SS20).

The role of the environmental department in environmental management includes ensuring environmental considerations are taken into account throughout the municipality:

... when reports are being drafted for such developments, whether by the private sector or by us, we usually circulate to all these departments and as an environmental department we usually put our comments ... all environmental aspects must be considered ... (LG-SS18).

She gave examples of practices that could solve environmental problems: "... some business premises do have service providers that separate waste from source" (LG-SS7). She also feels that the benefits of natural resources can be used as a motivation for their sustainable use: "... because we also have reeds in the wetland ... they can be able to sort of utilise the reeds for some handiwork and be able to sell them and get something from that" (LG-SS26).

Document analysis of education material

Solutions to environmental issues alluded to in the materials include "... encourage people to become active supporters of sustainable and equitable living ... involving communities in environmental greening activities ..." (LG-DA5).

4.3.2.5 Environmental legislation

Curriculum workshops

References to environmental legislation and policy help provide insights into understandings of environment and the role of legislation in resolving environmental issues. The data from the workshops suggests that environmental education should consider "national legislation and policy with regards to citizens and environment" (LG-CQ3), "interpretation of environmental legislation" (LG-NA3) and "policies/guidelines already in place, for example, NEPAD [New Partnership for Africa's Development] and Batho Pele [means People First – a policy that guides all levels of government]" (LG-CQ4). The data suggests that environmentally sustainable practice can be guided by legislation such as "sustainable land-use planning to be included in IDPs [Integrated Development Plans]" (LG-NA2), the development by local government of "new by-laws to deal with environmental issues" (LG-NA3) and the "compliance and monitoring of environmental legislation" (LG-NA3).

Semi-structured interview

Jane sees environmental legislation as a useful imperative for better environmental management and the role of local government can be to "...exert pressure on national government" (LG-SS15) for the enforcement of legislation. Later she remarks:

Our role will actually be to ensure that management understands what environmental management is ... what their responsibilities are ... Talking about the state of environment report, they might be sitting up there and not knowing the contents ... we are also dealing with politicians so it is our role to conscientise the politicians ... (LG-SS37).

4.3.2.6 Environmental ethics

Curriculum workshops

Ethical aspects of environment are raised, for example, by the concern for "rights and responsibilities of citizens to a healthy environment" (LG-CQ18). This concern does not reflect any particular ethical orientation but rather suggests that the EETDP qualification should deal with environmental ethics.

Semi-structured interview

When asked to explain the impacts or results of illegal dumping of waste, Jane's response was that "mostly it is unsightliness ... and health implications ... but there isn't as much environmental impacts" (LG-SS5). Later on, she commented that "... they [communities] are not aware that these are wetlands ... they need to understand how they can benefit from them" (LG-SS25). These responses seem to imply an anthropocentric ethical orientation where the negative impacts of an environmental issue are understood in terms of their negative impacts on people and the need to look after wetlands is justified by their potential usefulness to people.

Document analysis of education material

The material has a mix of environmental ethical perspectives from anthropocentric perspectives where many benefits of trees to people are listed (LG-DA7 & 8) to a more eco-centric orientation where the uses of trees to nature are listed (LG-DA8) highlighting the inherent value of nature without reference to any human benefits.

4.3.3 Agency

I identified five sub-categories that have a bearing on agency including:

- Education/knowledge,
- Environment/ethics,
- Skills/capacity,
- Resources/power/participation, and
- Motivation/choice/free will.

4.3.3.1 Education/knowledge

Semi-structured interview

In Jane's view, the role of knowledge and awareness in individual agency, particularly regarding environmentally sustainable behaviour, is an important one:

... most people they do things because they are not aware, they are not learned about that so once you educate them then you capacitate them. You give them information for them to be able to use so that is how I see the role of environmental education (LG-SS23).

I asked Jane if perhaps people are sometimes aware but that there might be other constraints that have a bearing on their behaviour:

Some of them they are aware and some of them are not ... but they don't have any alternatives ... and we give them even more information. To say that you are aware but you are not doing it [sustainable behaviour], we must get the reasons why they are not doing it. It might be economical reasons but then you need to come up with alternatives ... (LG-SS24).

Jane aims, through her environmental education practice, to provide people with knowledge and information that she feels will provide them with the ability to make more informed or conscious decisions about how to behave regarding environment and sustainability.

4.3.3.2 Environment/ethics

Curriculum workshops

The question “what are the rights and responsibilities of citizens with regard to a healthy environment?” (LG-CQ18) challenges environmental educators to consider environmental ethics in relation to individual agency. Ethical orientations are a form of social structure that play a role in shaping how we behave and what we consider to be responsible behaviour with regard to environment and sustainability. The question raised here seems to challenge environmental educators to tease out ethical considerations and develop the ability of learners to contribute to and shape ethical debates and so shape these social structures through their agency.

4.3.3.3 Skills/capacity

Engaging with or seeking to change social structures that lead to or allow unsustainable practice requires a great deal of skill or capacity on the part of an environmental educator (agent). One of the critical questions raised at the curriculum workshop asks “does local government have capacity to deal with the [environmental] problem?” (LG-CQ5).

Semi-structured interview

Jane’s comment that “... there is the new air quality bill, who is the institution responsible for the enforcement of that, I am not too sure” (LG-SS15) is a good example of the role of skills or capacity in individual agency. Her ability to engage with the structure of legislation and the department (agency) responsible for its enforcement is limited by her own admitted uncertainty about which government department it is that is responsible for that legislation.

Jane also refers to “training and capacity building for [local government] employees” (LG-SS17) and “we workshopped it [air quality management plan] with them [the community] ... so they know there is this plan, this is our responsibility as a community” (LG-SS22) as an important part of her environmental education work. Both of these are examples of developing skills and capacity that enables agency, for example, by developing their capacity to engage with the air quality management plan, a form of structure, the communities are able to contribute to and shape it.

4.3.3.4 Resources/power/participation

Curriculum workshops

The need for “consultation of and participation by communities” (LG-NA6) in environmental matters in the local government context reflects a concern for agency as local government is, in a sense, a structure that has power and resources to determine how environmental issues are dealt with, if at all.

Semi-structured interview

But then they are frustrated because sometimes you get an environmental group that is active and want to utilise a certain space for greening ... but then they can't get hold of space from private companies or the municipality and for them to get access to that land is quite difficult so it has limitations (LG-SS24).

This excerpt from Jane's interview is a good example of how the lack of resources and power of a group in society, in this case an environmental group, prevent them from engaging in environmental change through a greening activity.

4.3.3.5 Motivation/choice/free will

Semi-structured interview

“What we have now realised is that we have people, community members, who are really committed to environmental management ... these are the people that we work with most of the time ...” (LG-SS22) says Jane. By focusing on people who are motivated and engaging with environmental projects out of their own choice, Jane realises that there is much more potential for meaningful engagement and change in environmental practices.

4.3.4 Structure

The four sub-categories that I identified under the analytic category of structure are:

- Education/knowledge,
- Environment/ethics/sustainability,
- Skills/capacity/practice, and
- Resources/power/participation.

4.3.4.1 Education/knowledge

Curriculum workshops

The concern for “implications of Agenda 21 and Tbilisi Principles for local government” (LG-CQ11) and “national policy/legislation: what does it say regarding education?” (LG-CQ15) reflect an interest in how structures related to education enable environmental education. Such principles, policy and legislation provide environmental educators with a legitimate imperative for environmental education and also provide useful guidelines for environmental education practice.

Semi-structured interview

A habit, yes, because before then [apartheid] we didn't have any waste in our yards ... because there was no proper collection so people find the open space and just dump there, so parents were sending kids to go dump and as you grow old you think that way (LG-SS6).

This is how Jane felt that the practice of dumping waste has become a common practice and it links to the not very visible social structure of habit, formed in this case through factors shaped by apartheid and the lack of service delivery to townships. Jane articulated very clearly how this way of doing things is entrenched as normal by children growing up being told to dump and so that this is the only way they know.

We do environmental education for community members, especially our environmental forum members, our environmental NGOs, rural community members and our ward committee members, those are the structures we need to work with ... (LG-SS19).

Here Jane explains how these community structures not only provide access for her department for conducting environmental education but through these education activities, she hopes that the scope for changes in environmental behaviour increases: “... so they start behaving as environmentalists” (LG-SS20).

Internally, Jane explains why the provision of environmental education to local government management and politicians is important:

Our role will be to ensure that management understands what environmental management is ... what their responsibilities are as management of the organisation to ensure that everyone is actually participating ... it is also our role to conscientise the politicians ... (LG-SS37).

The management and politicians in local government structures are important decision-makers and Jane feels that increasing their knowledge of environmental management will enable them to participate in environmental choices and decisions.

4.3.4.2 Environment/ethics/sustainability

Curriculum workshops

Some of the needs identified in the workshops include the need for the EETDP qualification to support “sustainable land-use planning/management in the IDPs [Integrated Development Plans]” (LG-NA2) and the “compliance and monitoring of environmental legislation” (LG-NA3). Environmental legislation is a structure that provides an imperative for environment and sustainability considerations to be taken seriously in local government.

Semi-structured interview

... Some of these departments don't see environmental management as their core function, its something small within their department but then the [environmental] department will have to ensure that all the other departments consider that [environment] (LG-SS36).

Here Jane is discussing the structure of her municipality and the implications for environmental management, how other departments sometimes do not engage with environmental considerations because this is seen as the responsibility of the environmental department.

4.3.4.3 Skills/capacity/practice

Curriculum workshops

The need for sustainable waste management was identified along with the recognition that “current practice is only to collect and dump” (LG-NA1). This practice of dumping in land-fill sites has become such an entrenched or habitual practice in local government that it is, in a sense, an informal structure that shapes the way municipalities behave in terms of waste management.

Semi-structured interview

“We do environmental capacity building for our employees but that has not kicked off nicely as yet but we are getting there ... we are still busy with the [environmental education] planning strategy” (LG-SS19). Here Jane sees the role of her department in capacity building and developing skills that enable workers in local government to move to more sustainable practice such as recycling. The dependence on an environmental education strategy is a structure that will be enabling once it has been completed but is at present constraining in the sense that, until it is completed, not much internal capacity building is taking place.

4.3.4.4 Resources/power/participation

Curriculum workshops

Concerns around “improved cooperation/communication between the three levels of government” (LG-CQ1) and “support for inter-departmental planning/communication” (LG-CQ14) are examples of a recognition of the need for a better structural balance and sharing of resources and decision-making regarding environment and sustainability both within and between the levels of government.

Semi-structured interview

“There is an issue of waste and the municipality has said it will close some of those [illegal] dumps ... they do check on them ...” (LG-SS7) indicates that local government does have the power, through environmental legislation, to enforce environmentally sustainable practice. But a constraint that faces Jane and her department is a lack of staff: “I don’t think we do [have enough staff] because for the projects we need to have time for consultations” (LG-SS30). This constraint of a lack of resources means enforcement is not always carried out.

Jane discusses the structure of her own department in terms of its authority to ensure other departments take environment and sustainability seriously: “you need to have this department overseeing the other departments that have a smaller portion to play with regards environmental management ... then the bigger department will have to ensure that the other departments consider that” (LG-SS36).

4.3.5 Reflexivity

4.3.5.1 Reflexivity in education

Curriculum workshops

Some of the data from the workshops alludes to the need for environmental educators to have reflexive skills in their education work. For example, there is a concern for “changing contexts regionally and nationally” (LG-CQ4), “adaptation/re-presentation of information in contextually appropriate ways” (LG-CQ16) and the “critical selection of information and materials” (LG-CQ17).

Semi-structured interview

Some of the responses that Jane made during the interview show evidence of reflexivity in her education work or, in some instances, education as a reflexive response to practice-related issues:

...we planned for the training and capacity-building for the [local government] employees ... because we are not actually recycling our waste enough ... (LG-SS17) and:
... environmental education has been done over and over again but what we want to do now is sort of formalise it ... (LG-SS21).

Jane's recognition of the importance of participation by learners in the development of learning programmes seems to be a reflexive response to earlier approaches that did not involve participation:

Without them [communities/learners] there is nothing you can do, you can go there and implement a programme that you developed on your own in your office and at the end of the day you won't have an impact ... (LG-SS22)

There is also evidence that Jane is reflexive during education activities:

... we can see from the response that we get from them that some of them are not aware but then some of them are aware ... we must get to the reasons why they are not doing it ... you need to come up with alternatives ... (LG-SS24)

One of Jane's responses shows that she also encourages reflexive skills in her learners: "... the type of training [we do] is actually their [the learners'] responsibility, to give their problems and get solutions to these problems" (LG-SS27).

4.3.5.2 Reflexivity in practice

Curriculum workshops

Workshop participants identified two needs that the EETDP qualification should aim to address: learners in local government should grapple with "the implications of the lack of environmental management with regards to land-use planning and management" (LG-NA2) and, secondly, consider the development of "new by-laws to deal with environmental issues in local government" (LG-NA3). Both of these needs allude to reflexivity in practice.

Semi-structured interview

"What we have now started to do with regards these new developments, we have got an environmental forum and we are trying to get the communities to participate in the EIA processes ..." (LG-SS16) shows that Jane and her colleagues are reflexive in their practice, responding to developments by enabling participation by communities in the environmental impact assessment processes. Jane suggests ways that

changes to the structure of her department might enable more sustainable practice: “internally one can solve these problems [by] restructuring these departments ... put your environmental sections in one department ...” (LG-SS34). This is evidence of her critically reflecting on her work situation and considering new or different ways of doing things.

4.4 Conclusion

In this chapter, I have provided two nested-case narratives that draw on and present the data with many extracts from the raw data. The structure for the narratives has been provided by the analytic categories and sub-categories which has allowed a guided analysis of the data. This chapter has allowed the reader to engage directly with much of the data and to draw conclusions or gain insights that may be different to those that I have drawn. The careful coding and referencing of the data allows for verification with the original data source. In the next chapter, I engage in a discussion of the data and relate it to the broader context or case of the EETDP qualification. In this discussion, I also draw on the literature related to the concepts that are discussed.

Chapter 5 Considering contextual understandings of epistemology, agency and reflexivity in the EETDP qualification curriculum

5.1 Introduction

In chapter four, I have provided a detailed or thick-description of the data, drawing on extracts of the raw data to provide a narrative of each of the nested cases. These two nested cases were presented separately without any discussion across the nested cases. In this chapter, I now discuss the findings presented in chapter four and discuss both nested cases in relation to the broader case of the EETDP qualification. In doing this, I address the research question directly, which, as discussed in chapter one indicates that the research aimed to develop an understanding of workplace epistemologies and institutional structures in order to inform curriculum development that is enabling of reflexive environmental education and training processes in the context of the EETDP qualification. The following goals guided the study:

- To develop an understanding of the workplace contexts of environmental education and training practitioners in two sectors: agriculture and local government;
- To probe the workplace epistemologies around environment and education, including current theories of knowledge, current ways of knowing and how knowledge has been and is created, in these two sectors.
- To consider the institutional structures in these two sectors and how these may influence agency and possibilities for action and change through environmental education.

These goals were used for identifying issues that need to be considered in curriculum development that is enabling of reflexive learning processes in these two workplace learning contexts for the EETDP qualification. The study focussed on epistemology, structure and reflexivity, as reported in Chapters 2, 3 and 4. The aims and goals are now considered again, this time to establish what insights have been gained through this study in response to the research aims and goals.

To facilitate the discussion, I have condensed the data into analytical statements (Bassey, 1999). These analytical statements are drawn from the data as reported in chapter four. This discussion of the findings in relation to the research question, thus synthesises the findings of the study presented in chapter four, by

means of the analytical statements, which have helped to focus the discussion of the findings. The discussion in this chapter also draws on the theoretical and contextual discussions presented in chapter two.

5.2 Contextually informed curriculum development

5.2.1 Why the concern for context?

Reflecting on the findings in chapter four, it is evident that there is a concern that the EETDP qualification should pay careful attention to the context of the learners. This concern can be summarised in the following analytical statement:

Analytical statement 1:

The EETDP curriculum is likely to be significantly influenced by diversity in socio-cultural and structural features of context in different learners' workplaces

The findings in chapter four, reflects the need for sensitivity and responsiveness to the context of the learners, including both local and global influences and aspects of context. The data also reveals that the two different contexts studied, while having environmental education practice as a common concern, have very different socio-cultural and structural contexts of operation, and that work place contexts, while having some similarities (i.e. both are governed by aspects of environmental policy) also have contextual differences.

A starting point for gaining an understanding of this concern for context is with the EETDP qualification and its purpose, as outlined in section 1.2 where it was explained that it has been developed for the professional development of environmental education practitioners in a diversity of contexts. It was also explained that that NQF accredited qualifications are structured in a way that content and context are not strictly prescribed with these aspects of curriculum design left largely to the training provider (see section 1.2). This has posed a challenge for the curriculum development for the EETDP qualification that will have learners from at least five different sectors, with significant contextual variations within each sector (see section 1.4). The challenges for curriculum design include decisions around whether a separate set of learning support materials should be developed for each sector/context or whether the different contexts can be catered for in one set of materials that deals with both generic and context specific issues or aspects. Either way, the

challenge of dealing with contextual aspects remains. It was these challenges that led to this research interest in the first place: questions of how environment and education are understood in different contexts, what structural factors influence the agency of environmental education practitioners in different contexts and the role of reflexivity in responding to environmental issues in context. The data from the curriculum workshops, as the first phase of data collection and analysis, played a role in shaping my research interest and choice of additional methods that included the semi-structured interviews and document analysis of education materials. The findings discussed in the following sections are essentially aimed at gaining a deeper understanding of the two contexts that were researched in this study.

What is the rationale behind this concern for context? It may be useful to start by asking the question the other way around: 'under what circumstances would a concern for context in education not be necessary?'. When the subject matter is universal and undisputed such as in mathematics where one plus one is two, for example, will context be a necessary consideration? Cornbleth (1990) says that technocratic approaches to curriculum development ignore context at two levels, both conceptually and operationally. In the example above, one might argue that the conceptual context would not be a necessary consideration for a mathematics teacher. One plus one will be two no matter what the education orientation or epistemological frameworks of the teacher. However, the operational context that includes structural, sociocultural and historical aspects (*ibid*, 1990) would surely have a bearing on the educational approaches and methods that a mathematics teacher uses, as has been shown in the teaching of mathematics and in the poor mathematics performance in South African schools. The Department of Education has since developed policy that emphasises context in mathematics (Howie, 1998).

In sections 2.4.1 and 2.5, I discussed the nature of knowledge and understandings of environment and environmental issues and risks. The changing, complex and contested nature of knowledge and in many situations, lack of knowledge about environmental issues and risks has implications for the conceptual context of environmental education. Insufficient knowledge or contested views about an environmental issue such as the impacts of air pollution from a certain factory, for example, mean that from an epistemological point of view, environmental education cannot be approached with technocratic certainty. Sticking with the example of the polluting factory, if a technocratic educational approach that ignored context were to be adopted by environmental educators in local government, what knowledge and whose views would be placed in the position of authority and seen as valid? Is it the scientific research presented by the factory management that asserts that on average, there is no increase in disease within the affected community? Is it the knowledge of the mothers in the community whose children are suffering with diseases like asthma and cancer? Is it the knowledge of a concerned nature lover, who has observed a decrease in biodiversity in

the nearby forests and grasslands or that of the family who recently moved into the local informal settlement and who wait patiently outside the factory gates in the hope of being employed? What these questions imply is that a technocratic approach to environmental education that ignores the epistemological and socio-political context forces the educator to position him or herself, either consciously or unconsciously, with regard to the validity of a certain viewpoint or understanding of the issue. The danger of this is that the educator is then promoting a particular ideology, and narrowing epistemological possibilities.

In addition to the epistemological context, there are also a number of factors that shape the operating context of an environmental educator. These include the structural and sociocultural contexts (Cornbleth, 1990) such as culture, social norms, habits, education, ethical orientations, history and economic situation of different learners or learner groups as well as aspects such as legislation and policy. A technocratic approach to education that ignores the epistemological context and seeks to impart one view or understanding of an environmental issue and its causes and solutions to learners is also likely to either ignore the operating context or superficially respond to it as a way of improving the efficiency of 'getting the message across'. This is evident in the practice of both David and Jane as reflected through the semi-structured interviews. Both of them saw education as a process to "ensure the message you are conveying is grasped" (AG-SS23) and "make people aware of what environmental management is..." (LG-SS20, see sections 4.2.1.3 and 4.3.1.4). These comments reflect a leaning towards a technocratic conceptual orientation to education where the educator has a specific message or knowledge that needs to be imparted to the learners. Yet, at the same time, both David and Jane showed evidence, through their responses, of sensitivity to context and the participation of learners (see sections 4.2.1.4 and 4.3.1.4). However, a careful examination of the way that context and participation are dealt with in the agricultural case, reveals that it is used as a way of enhancing the delivery of the 'message', for example "it must be a participatory process ... they report back so you see if they understand" (AG-SS24, see section 4.2.1.4). In the local government context, the consideration of context and participation of learners seems to be more authentic: "we are trying to get the communities who live near the developments to participate in EIA processes, to add their views" (LG-SS16, see section 4.3.1.3), is just one of a few examples of a genuine consideration of context.

The analytical statement and discussion here have explained the concern for context to be considered in the development of the curriculum for the EETDP qualification and a rationale for this. The rest of the study starts to provide insights into two of the contexts where the EETDP qualification will take place. In chapter six, I provide a meta-perspective on the two nested cases and the implications of the contextual differences for the EETDP curriculum.

5.2.2 How environment and sustainability are understood

Drawing on the data from the curriculum workshops, the semi-structured interviews and the document analysis of education material, as reported in Chapter 4, the following analytical statement can be made regarding how the concept of environment is understood in the two nested cases, and its implications for the EETDP curriculum.

Analytical statement 2

The EETDP curriculum is likely to be influenced by ambiguous and contextually specific / work place specific understandings of environment that exist in different contexts and work places.

As shown in the case-based findings reported in chapter four, understandings of environment in both the agricultural and local government sectors can be ambiguous. This ambiguity is due to different and contradictory understandings of environment. For example, explicit responses to the question 'what is environment?' in both cases reveal understandings related exclusively to biophysical dimensions of environment. However, implicit in the range of data is a broader understanding that includes economic, political and social elements that are *contextually situated and closely related to the workplace or operating context* (see sections 4.2.2 and 4.3.2).

In chapter 2, section 2.5, I have discussed epistemology or how knowledge is created and validated regarding environment and education. This discussion looked at how scientific explanation of knowledge and technical solutions to environmental problems have become the dominant way of understanding and perceiving solutions to environmental problems. These understandings often result in linear, cause and effect understandings of environmental problems with scientific environmental management seen as the solution (see section 2.5). I also looked at ways of understanding environment that are underpinned by more socially situated understandings related to conscious and unconscious intentions behind human actions and solutions to environmental problems that emphasise the ability of people to make judgements and correct decisions in context. The implications of these different epistemological frameworks for education were also discussed. I now discuss the above analytical statement drawing on more specific examples of the data and relate it to the discussion on epistemology in chapter 2.

Both David and Jane, when asked what they understood by 'environment', responded with examples mostly related to the biophysical dimension of environment and both their responses related directly to their

working environment and/or education background. David has a national diploma in agriculture and sees environment as “something that is grown ... timber ... vegetation ... dams ... soil ... crops” (AG-SS1). Jane, with a national diploma in environmental health, says that environment is “ecosystems, different species, plants, animals ...” (LG-SS2). The curriculum workshop data and document analysis of education materials support this finding with the majority of environmental issues identified relating to ecology and the biophysical environment, see sections 4.2.2 and 4.3.2.

Although their initial definitions of environment were both largely restricted to biophysical elements, when asked about environmental issues, David and Jane both responded with examples that reflect a broader understanding of environment that includes economic and social aspects. For example, David sees the lack of markets, difficulties with marketing and getting produce to market faced by emerging farmers as an environmental issue. Jane sees waste as an environmental issue and related it to the historical context of apartheid and its impacts as unsightliness and health issues though she did say it has no real environmental impacts. Jane’s comment points to an ambiguity in the understanding of the term ‘environment’ where she at first points out to social and political aspects of the waste problem as environmental issues and then later says that there are no environmental impacts caused by waste. It can be assumed that in this latter comment, she means there are no important biophysical impacts caused by waste. The fact that both David and Jane referred to their studies as the source of their understanding of environment, suggests that the understanding of environment that dominates in the tertiary institutions that they studied at is one of environment as nature. Once in their working context, however, it would seem that their understandings of environment broadened to include economic, social and political dimensions that are contextually situated or linked to their work. It would seem that both David and Jane have everyday ‘common sense’ understandings of environment that they have developed through their daily work experiences and interactions, where they recognise the relationships or connections between different dimensions of environmental issues. Overlaying this, it seems, is a more theoretical or differentiated understanding, developed through their studies, of environment as nature and this academic understanding is at times contradictory to their broader everyday ‘common sense’ understanding of environment. This finding is similar to that of Odora (1994) cited in Lotz-Sisitka (2002:118) where she discusses how the systemised knowledge in formal education systems tends to limit understandings of environment to ecological, physical and technical terms and how more culturally situated knowledge has been ‘subjugated and rendered irrelevant by a scientism characteristic of modern Western epistemology and education systems’.

As an agricultural extension officer, David’s work is not explicitly related to environment and sustainability and so I asked him to explain his understanding of sustainable agriculture. His response implies an

understanding of sustainability that foregrounds the sustaining of agricultural practice: “sustainable agriculture is to ensure that what has been put is being used effectively and those people will benefit from it for a long time, not something that will end, it is continuous” (AG-SS13). With the focus so strongly on sustaining agricultural production, this understanding does not reflect a concern for the natural environment, both for its inherent right to exist and for the ecological services that play such an important role in sustaining agricultural productivity. When looked at with his definition of environment in mind, it seems that David does not relate sustainable agriculture to environmental considerations. The example of sustainable agriculture that David gave is what he termed the ‘no-till’ method. As he explains, this method involves spraying the field twice with herbicide to kill off all plant growth that is then burnt, fertilizer is applied and further herbicides and insecticides are used once the crop starts growing. In the material analysed, there is no mention of a need to consider the possible environmental impacts of the method, the only concern is that herbicides incorrectly applied can waste money and spoil the crop (see 4.2.2.6). This understanding of sustainability is perfectly compatible with David’s view that current conventional agricultural practice is sustainable (see 4.2.2.1). Sachs (1993:10), in a critique of sustainable development, quotes the World Bank’s definition that is not entirely different from David’s, as ‘sustainable development is development that lasts’. This way of seeing sustainability has an anthropocentric bias as ‘it is not the preservation of nature’s dignity which is on the international agenda, but to extend human-centred utilitarianism to posterity’ (*ibid*, 1993:10).

5.2.3 Solutions to environmental issues

David and Jane both agree that better management, and education and training to support better management, will lead to solutions to environmental problems (see sections 4.2.2.4 & 4.3.2.4). The curriculum workshop data also reflects this view with most solutions listed relating to environmental management practices. Combined with this view of better environmental management is a view that potential benefits to people can be used as a motivation for sustainable use of natural resources reflected in the interviews and analysis of education materials. These views can be summed up in the following analytical statement:

Analytical statement 3

The EETDP curriculum is likely to be influenced by (and will need to take account of) technocentric and anthropocentric views of environmental knowledge and practice held by educators and learners in different work places.

The findings reported in chapter four reveal that solutions to environmental problems in the agricultural and local government nested cases are largely seen as better technical environmental management and reflect an anthropocentric view of nature in service of human needs. As discussed in section 2.5, scientific explanation has become regarded as the most valid way of understanding in the world today and this results in understandings of environment and solutions to environmental problems that are based in the natural sciences. In this linear, cause and effect way of understanding environmental issues, the focus tends to be on the biophysical manifestations or dimensions of environmental problems and solutions are seen as environmental management that is informed by technical scientific knowledge about the problem.

This approach to solving environmental problems does not stress the role of individuals and groups in society to make judgements and decisions in their living and working contexts, regarding appropriate action to resolve environmental problems. An emphasis on environmental management and the expert knowledge required to solve environmental problems can be disempowering of local responses in context by communities, farmers and local government employees. Further, environmental management is often based on a deficit approach that focuses on direct, negative environmental impacts and so is often not preventative but rather reactive to environmental problems (Lotz-Sisitka, 2005). A more proactive or preventative approach to environmental management would involve managers and workers developing critical and more in-depth perspectives on environmental management (*ibid*, 2005), a role that environmental education could play in both the agricultural and local government contexts. This will be discussed further in chapter six.

5.3 How environmental education is understood

Just as the understandings of environment were ambiguous, there also seems to be ambiguity in the way that education is understood. On the one hand, an education orientation that leans towards behaviourism with expert-led transmission of knowledge to learners is evident and yet at the same time there seems to be a fair amount of concern for participation of learners in the education process. These findings can be summarised in the following analytical statement:

Analytical statement 4

The EETDP curriculum is likely to be influenced by ambiguities in the way that environmental education is understood in different work place contexts.

As shown in the two nested cases reported in chapter four, environmental education is understood as an expert-led transfer of knowledge about environmental problems and solutions in order to develop awareness and change behaviour although there is also a seemingly contradictory concern for active participation of learners in the learning process.

This ambiguity in the understanding of environmental education is closely tied to the ambiguity in understandings of environment discussed in section 5.2.2 above. The understanding of environment as nature and environmental problems as ecological problems informed by a natural sciences perspective is likely to lead to a behaviourist orientation to education as discussed in detail in section 2.5. This seems to be the case in both the local government and agricultural cases, particularly so with regards the education materials that were analysed. However, in the semi-structured interviews, both David and Jane provided examples that show that their education practice is not what would be expected from their stated orientation to education. The descriptions of their practice include a concern for the active participation of learners and in Jane's case this extended to a genuine consideration of the learners' own knowledge inputs and solutions to environmental problems.

I suggest two possible explanations for this apparent contradiction. The first is the same explanation given for their ambiguous understanding of environment discussed in section 5.2.2 above, with different layers or ways of understanding informed by theoretical or differentiated knowledge on the one hand and more situated, common sense knowledge on the other. Drawing on this common sense knowledge and experience, David and Jane instinctively encourage participation of their learners and recognise that learners have important existing knowledge, values and beliefs that are an important part of the learning situation. So, although their stated intention as educators is to impart knowledge and awareness to learners, they do not necessarily see learners as passive in the education process.

A second possibility is that the active participation of learners could be more politically motivated through legislation, policy and custom than through considerations of education orientations and theory. For example, two of Jane's examples where she described the active participation of learners involved situations where such participation is legislated, one in the legislation for environmental impact assessments and the other related to the Ekurhuleni Municipality's air quality management plan. The emphasis on participation in much policy in South Africa today is a response to the dominant authoritarian policies of apartheid, replaced now with a participatory democracy where citizens are accustomed to workshops as forums for participatory decision-making and problem solving (Ashwell, 1997). Lotz-Sisitka (2002:103) discusses how with the political changes in the early 1990's 'policy-making came to be reinterpreted through

the language of participation, transparency and accountability'. This tradition of participation, now captured in formal policy, is likely to shape education practice, even if only at a subconscious level.

There is a tension between the instrumentalist, technical-rational approach to environmental education as a means to predetermined ends of scientific environmental management that David and Jane articulated and their actual practice that appears to be more contextually situated and responsive to learners than would be so if their practice was shaped by their stated education orientations. This tension will need to be explored further and has implications for the development of the curriculum for the EETDP qualification that is aimed particularly at education practitioners like David and Jane. This will be discussed further in chapter 6.

5.4 Spaces for environmental change through education

As discussed in section 2.4.1, environmental education aims for social transformation and change through a critical or reflexive consideration of existing knowledge, values and practices and seeks to engage learners in actions for change. In section 2.6 I discussed some of the theory around structure and agency or the level to which human actions are voluntary and the role of social structures in determining certain aspects of behaviour, in ways that can be either enabling or constraining of agency. A deeper understanding of human agency and the structures that can enable or constrain human agency and action is informative for environmental educators whose work seeks social transformation. Looking at the data with structure and agency in mind, the following analytical statement can be made:

Analytical statement 5

The EETDP curriculum is likely to be influenced by various social and institutional structures (for example education and knowledge; environment and ethics; skills, capacity and existing practice; and available resources, power and participation opportunities). The constraining and enabling influences of these structures on the agency of the learners is likely to be a key curriculum consideration.

As described in detail in chapter four, social and institutional structures related to education/knowledge, environment/ethics, skills/capacity/practice and resources/power/participation are evident in the two nested cases. Some of these structures are enabling and others are constraining of the agency of environmental education practitioners in their work for environmental change (see sections 4.2.3, 4.2.4, 4.3.3 and 4.3.4). In table 1.6 below, I present these four aspects of

structure/agency in relation to both enabling and constraining aspects of structure that appear to have a bearing on agency of environmental educators in the two nested cases.

Table 1.6 Enabling and constraining structures related to agency in the context of environmental education in the agricultural and local government nested cases.

Aspects that have a bearing on agency	Structures enabling of agency	Structures constraining agency
Education/knowledge	<ul style="list-style-type: none"> • Education policy e.g. Agenda 21 • Global environmental education principles e.g. Tbilisi, UNCED, etc. • Formal education background of agent • Education materials 	<ul style="list-style-type: none"> • Over-emphasis on technical and systematised or differentiated knowledge • Habits/custom • Formal education background of agent • Education materials • Lack of education/knowledge
Environment/ethics/sustainability	<ul style="list-style-type: none"> • Ethical orientations • Global environmental ethical principles • Environmental legislation • Environmental standards/eco-labelling 	<ul style="list-style-type: none"> • Ethical orientations • Structure of environmental department in organisation does not cater for cross-disciplinary nature of environment
Skills/capacity/practice	<ul style="list-style-type: none"> • Strategy for environmental training/capacity building of employees and community • Structure of organisation includes specialised sections 	<ul style="list-style-type: none"> • low levels of environmental capacity of employees in the organisation • entrenched unsustainable practices, habits or culture • Traditional practices/indigenous knowledge dying out with urbanisation/globalisation

Resources/power/ participation	<ul style="list-style-type: none"> • Environmental forum, NGOs, ward committee members • Management structure of organisation • Collaboration with other organisations and departments 	<ul style="list-style-type: none"> • Insufficient communication between tiers or levels of government • Insufficient inter-departmental cooperation and communication within the organisation • Insufficient resources e.g. personnel, budget • Lack of authority of environmental department over other departments • Power of certain interest groups
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It can be seen that many structures can be both enabling and constraining of agency. A good example is education materials that, if used in an uncritical way, can perpetuate knowledge and practice that is unsustainable. The education material analysed from the agricultural sector is a good example of this where the material is a set of instructions that farmers must follow and the role of the extension staff is established as that of experts who provide further technical instructions for farmers to follow. The farming methods advocated in the materials are presented uncritically with no consideration of the environmental impacts of the farming methods. These materials are likely to reproduce both the role of passive emerging farmers instructed by expert agricultural extension officers and the agricultural practices advocated in the materials. This diminishes the scope for both the agency of the farmers and the extension staff to effect any change in the relationship between farmer and extension officer or to their agricultural practices, leading to what Archer would describe as morphostasis (no structural elaborations or changes).

Education materials, because of their important role in education, do have the potential to enable agency rather than constrain it. Sticking to the agricultural example, this would require a change in the design and education orientation of the materials that challenged both the educator (extension staff) and the learners (emerging farmers) to think more critically about the purpose of education, the role of the teacher, the role of knowledge, the role of the learners and the environmental implications of farming practices in their context. Without this more critical or reflexive orientation, the materials are likely to contribute to the reproduction of structures and practices. Education materials on their own are only one of many structural factors and are themselves shaped by other structural influences. Examples include economic structures such as agribusiness that may seek to reproduce practices that benefit it and therefore promote farming practices that rely heavily on external inputs. Although this may not be the case with the materials analysed in the

study, there are many examples of agribusiness sponsoring the development of education materials. Other structural factors that will have an influence on the design and content of education materials include the education background of the people who develop them, dominant epistemological frameworks, and entrenched habits or truisms related to agriculture practice to name a few.

Structures can only be enabling or constraining on agents in relation to the intention or a proposed 'project' of an agent (Archer, 2003). In other words, the causal power of either constraining or enabling does not only lie in the structures themselves but is also related to intentionality of the agent. The examples given in the table and discussion above, are in relation to the 'project' of environmental education that seeks social change towards more environmentally sustainable practice. Without this intentionality, the structures that are identified as enabling, could be constraining of agents who may want to pursue agriculture in its conventional form and who are not interested in the social, economic or ecological impacts of their farming practice. If the intention of a farmer, for example, is to make as much profit as possible then structural factors such as environmental legislation are constraining of his agency. Archer (2003:9) suggests that agents are reflexive towards themselves, society and the relationship between them and that this reflexivity is possible through the 'internal conversation' where agents articulate to themselves where their interests lie, what possible courses of action to take and they consider the social or structural factors that have a bearing on different courses of action. It is this reflexivity that allows humans to have agency at all, without it we would really just passively respond to causal factors in the physical and social environment (*ibid*, 2003). This points to the importance of reflexivity for both environmental educators and their learners to be able to consider different structural factors and consider appropriate courses of action with regards to environment and sustainable practice, a discussion that I take further in section 5.5 below and in chapter six.

5.5 Reflexive education and practice

The following analytical statement can be made regarding reflexivity:

Analytical statement 6

The EETDP curriculum is likely to be influenced by a concern for reflexivity in education, as well as a concern for reflexivity in practice (in work place context).

As shown in the findings reported in chapter four, there is a concern for reflexivity in education *and* reflexivity in practice reflected in the curriculum workshop data. There is evidence in the data from

the semi-structured interviews and document analysis of reflexivity in education *and* reflexivity in practice in some instances and a lack of reflexivity in others (see sections 4.2.5 and 4.3.5).

5.5.1 Reflexivity in practice

David shows signs of reflexivity in his practice when he recognises the structural constraint of the hierarchy of his organisation and chooses to break with protocol and directly access resources and knowledge from his regional office without, as protocol would require, going through his boss. He explains that he does this because the information and resources were not forthcoming through the established channels. Another example of this is the use of his vehicle to help farmers get their produce to market, despite this going against the policy of his department. The alternative is for David to blindly follow the policy and effectively have all his other work negated as the farmers' crops lie and rot in the fields. This is a good example of how a constraining structure, the policy of the department of agriculture, has no causal power because of David's reflexivity that enables or provides the means to his agency, in this case the choice to consciously ignore the constraining structure despite its possible consequences. David has evidently thought this through carefully and in the interview asked to remain anonymous largely because of the fact that he is aware of the possible repercussions of his choices. What these examples show is how reflexivity can prevent even formal structures from having any causal constraint on agency. One can easily see how reflexivity applied to less formal structures such as habit might help rob them of their causal constraining power as there are less likely to be negative consequences that can result from the enforcement of more formal structures, although, as can be seen in the work of Bourdieu (1998), habit can be closely associated with *habitus* which is a social disposition which we are not always conscious of, making. Reflexivity is therefore a more complex matter, as reflexivity, and Archer's theorising on agency, seems to assume a rationality that allows clarity of reflexion on the taken-for-granted (or unconscious dimensions of practice).

Jane gives examples of how reflexivity in her practice can lead to the formation of new enabling structures. She gives two examples of this, one where her department was instrumental in forming an environmental forum as a structure that enables communities to participate in environmental decision-making and enables more formal interactions between her department and community representatives. The other example she gives is the formalising of environmental education by seeking for her department to become an accredited education and training provider. Jane reflects on how much of the environmental education done by her department has not resulted in environmental change. She cites recycling as an example where even in her department waste is not recycled. Her reflexive response is to formalise her department's education and training through the enabling structure of the NQF. This, she believes, is more likely to lead to change

through internal training of municipal workers. Jane also suggests that the way that her environmental department is structured could be changed in order for its work to be more effective. Although Jane may not have the individual agency to effect such a change, it does show that she is reflexive in her practice and is thus able to consider new or different ways of doing things. Without this reflexivity, the structure of her department would not be questioned and is likely to remain as it is indefinitely. These examples show the relationship between reflexivity and agency and how reflexivity can enable agency through changing or creating new structures. The discussion also points to the difficulties that individual agents may have in effecting structural changes, and points to the potential dangers of educators assuming simplistic causal connections between an individual's inherent capacity for reflexivity, their agency and associated structural elaborations (or change), indicating that this is a complex social process, and that care should be taken not to 'process reduce' these complexities through / in educational or management practices or methods.

5.5.2 Reflexivity in education

All of the examples above show evidence of reflexivity in practice and are not directly related to reflexivity in the education process. The evidence of educational reflexivity is harder to find in the data, an experience shared by Raven (2005). The data from the curriculum workshops for both the agricultural and local government nested cases reflects a concern that environmental education should be a reflexive process. This implies that environmental educators be reflexive in their own education practice and that they pay attention to developing the reflexive competence of the learners. For example, environmental educators are encouraged to consider the effectiveness of their education in their context and to reflect on reasons for this. The data also suggests that educators should pay attention to how information is adapted or represented in contextually appropriate ways. David showed some evidence of this in his education work when he says that his education programmes have to be versatile and should change if there are problems. However, the example he gives shows reflexivity more at a logistical than an educational level where the changes relate to changes in the meeting times with his learners. Some of Jane's responses in the interview show evidence of her being educationally reflexive. For example, she says that her learners are sometimes aware (i.e. they have prior knowledge of an issue) but that this is not reflected in their behaviour and that as an educator, she needs to investigate this further and come up with alternatives. She also seems to pay attention to developing the reflexive competence of her learners when she says that she encourages learners to identify problems and find their own solutions. These examples show that in her teaching, Jane seems to be conscious of both her and her learners' awareness and unawareness or lack of knowledge regarding certain issues.

The role of reflexivity in education can be to uncover unawareness as shown in the example above and discussed in section 2.7. This reflexive ability to consider not only what is known about an issue or situation but to be aware that there are also unknown aspects and to proactively seek out new knowledge or solutions goes beyond the more reactive meaning attached to reflexive competence as defined by SAQA and discussed in section 2.7. As with reflexive practice, discussed in section 5.5.1 above, so can reflexivity in education have a bearing on agency. For example, an un-reflexive educator who is operating within a specific education orientation, with certain epistemological assumptions will continue to unquestioningly operate within the boundaries that such orientations and epistemological frameworks impose. Such an educator would not even be aware that their education practice is constrained in any way and so will have little agency to change. Such an educator will continue to reproduce the educational structures (orientations/epistemologies) that shape their practice. By contrast, an educator who is reflexive will constantly critically examine their education practice and consider when different education methodologies might be appropriate in different contexts. A reflexive educator would consider the role of knowledge in education and carefully consider when it is appropriate to provide a lecture on a certain topic or draw on learners' prior knowledge and when to investigate and discover new knowledge together with learners. Such an educator would consider the implications for education when there is contested knowledge or a lack of knowledge about a particular issue. These are important considerations for the EETDP qualification that seeks to enable environmental educators to contribute to environmental change through education (see section 2.7).

5.6 Conclusion

The research findings indicate a concern for context and reflect a diversity of socio-cultural and structural features relating to the context in which environmental education practitioners in the two nested cases work. The implications of context for environmental educators include a need to consider both their conceptual or epistemological context and their operating context. The findings reflect that in both nested cases there is ambiguity in the understanding of the concept of environment and in understandings of education that seem to stem from different forms of knowledge being fore-grounded at different times. Differentiated or theoretical understandings in both cases seemed to reflect technical and instrumentalist approaches to environmental education whereas the actual practice reflected in the findings seemed to draw on more common-sense knowledge that reflected awareness of interrelations between different dimensions of environment and paid attention to the participation and prior knowledge of learners. The involvement of learners in investigating environmental issues and making judgements in their context about possible solutions is an important consideration when many environmental issues are complex and contested and

when there is often insufficient knowledge about them. In terms of the structural aspects of context, a range of social structures is identified in the data that are enabling and/or constraining of the agency of environmental educators. The causal power of structure to constrain or enable change in the context of environmental educators seeking social transformation lies not only in the structures themselves but is related to the intentionality of the educator. Through reflexivity, an educator is able to respond to social structures as he or she considers appropriate courses of action with their learners. In this way, for example, a social structure that encourages unsustainable practice can be challenged and/or modified through carefully thought out education activities and practices. These findings provide useful insights for environmental education practitioners working in the agricultural and local government sectors. In chapter six I draw on these findings to make concluding recommendations for the EETDP qualification curriculum development.

Chapter 6 Conclusion and recommendations

6.1 Introduction

In this chapter, I provide a brief summary of the research findings in relation to the research question. I then provide recommendations for the EETDP curriculum by drawing on the analytical statements and discussion in chapter five. This study is a tentative first step into gaining deeper insights into epistemology, structure/agency and reflexivity in the context of curriculum development for the workplace-based EETDP qualification. With this in mind, I provide a reflexive review of the research process that informed this study and finally make recommendations for further research.

6.2 Summary of research findings

This research aimed to develop an understanding of workplace epistemologies and institutional structures in order to inform curriculum development that is enabling of reflexive environmental education in the context of the EETDP qualification. This interest stemmed in part from recognising that the approach to education and training in many NQF accredited courses is often instrumentalist and technicist, largely because most NQF qualifications have been designed for education and training in very specific workplace contexts in business and industry and are related to specialised operational procedures in the workplace (see section 2.4).

Drawing on a range of environmental education literature and the research findings, I discussed how environmental education practitioners should be aware of and responsive to context and epistemologies of environment and education. Due to the complex, contested and changing nature of knowledge and, sometimes the lack of knowledge regarding environmental issues and risks, educators responding to such issues cannot draw on technicist education approaches without positioning themselves in one of many possible, and often contested, views about what knowledge is valid. These factors call for environmental education practitioners to be aware of and responsive to the epistemological context of their learners. The epistemological context includes, for example, how the learners understand environmental issues. Their understandings can, for example, be dominated by scientific or technical understandings where environment is understood in the terms of the natural sciences. This understanding appeared to be dominant in the two nested cases and is often accompanied by understandings of solutions to

environmental problems as technical environmental management underpinned by knowledge of the natural sciences such as ecology. Broader understandings of environment were also evident in the two nested cases where social, economic and political dimensions of environment and environmental issues are recognised, raising the issue of ambiguous understandings of environment. These broader understandings recognise that although environmental problems often manifest as biophysical issues in nature, the underlying causes are often related to complex historical, social, economic and political factors and their interrelations in different contexts.

In the case of the EETDP qualification, understandings of education are also an important part of the epistemological context of the learners who are, in this case, also educators. The technician understanding of environment, informed by the natural sciences, seems to result in a similarly technician or instrumentalist approach to education. This was evident in both the nested cases where the purpose of environmental education was mainly seen as that of an expert transmitting mainly technical environmental knowledge to learners. Although this orientation seemed to dominate in the two nested cases, there was also a concern for the participation of learners and sensitivity to context, raising the issue of ambiguous understandings of education. I have argued that in the context of complex environmental issues, educational responses cannot be based only on expert transmission of knowledge but need to provide for the learners to engage with their own prior knowledge, conduct investigations and make judgements about appropriate responses and practice under the guidance of the educator.

In addition to the epistemological context, there are also socio-cultural and structural features of context that have a bearing on environmental educators. An overview of the socio-cultural and structural contexts and historical factors that may need to be considered in each of the nested cases was given in chapter 2 (see sections 2.2.1 and 2.2.2). The socio-cultural and structural contexts of the two nested cases were also explored in more detail through the discussion of the research findings in chapter five. This discussion provided insights that addressed the research goal of considering the institutional structures in the two nested cases and how these may influence agency and possibilities for action and change through environmental education. One of these insights is that structures can be both enabling and constraining of agency and that the causal power of structures to enable or constrain does not lie only in the structures but also in relation to the intentionality of the agent. Reflexivity is the means through which agents are able to consider appropriate actions or responses to structural constraints or enablements. While there seemed to be evidence of reflexivity in practice in the two nested cases, evidence of reflexivity in education was less obvious. Educational reflexivity by environmental educators can help to uncover unawareness or hidden assumptions about their education orientations and methods and so enable them to adapt or respond to

epistemological structures/frameworks that might otherwise shape their education practice in unrecognised ways. These findings and discussion provide insights into some of the issues that may need to be considered in the EETDP curriculum development so that this qualification is enabling of reflexive learning processes.

6.3 Recommendations for the EETDP curriculum

I now draw on the analytical statements and discussion in chapter five to make recommendations for the EETDP curriculum. I draw on Combleth's (1990) view of curriculum as a contextualised social process that involves structural aspects of curriculum such as materials, as well as socio-cultural processes, such as learning on the course and in the workplace. The recommendations pay particular attention to workplace learning considering that 70% of the learning on the EETDP qualification is workplace-based.

6.3.1 Responding to context

Recommendation 1

The EETDP curriculum should be sensitive and responsive to the diversity in socio-cultural and socio-ecological features of context in different sectors and workplaces.

The socio-cultural features of context that could be considered for the EETDP curriculum include, for example:

- the historical events and processes that have shaped or influenced the sector or workplace as outlined in chapter two, section 2.2,
- the operational context that includes, for example, factors such as whether the environmental education practitioner operates mostly through fieldwork (as in David's case) or classroom-based activities or specific workplace situations or any combination of these (as in Jane's case),
- the nature of the environmental issues and risks in each context, as these have been shown to be different and differently perceived in different contexts (see sections 4.2.2 and 4.3.2)
- the background and role of the EETDP learners and the learners that they will be working with in each context e.g. professionals, management, workers, politicians/decision-makers or members of the public (for example Jane works with a broad spectrum of learners/stakeholders including the public, workers and management while David works mainly with small-scale emerging farmers).

The curriculum materials for the EETDP qualification will need to carefully consider this diversity of socio-cultural and socio-ecological factors, as these materials will be providing an orientation to learners in a range of sectors (two of which were considered in this study). For example, learners might be provided with a basic set of core materials that cover generic aspects that may not be too dependent on interpretations relevant to specific contexts while a larger, more diverse set of context-specific materials might be made accessible to learners to choose from, which would address specific socio-ecological or socio-cultural issues relevant to different contexts (for example, a text on working with learners who have little formal literacy could be made available for agricultural extension workers, while a text on how to work with complex management structures may be more appropriate for local government contexts). Learners could also be guided and supported to access materials from their work context which could be 'brought in' to the course curriculum as a way of addressing contextual diversity. Such materials can also be sourced by the learners from libraries, journals, other publications and the internet.

In terms of the design of the learning programme and learning activities, the EETDP curriculum should make provision for these contextually divergent socio-cultural and socio-ecological factors through, for example, providing learners with the opportunity to contribute to the design and choice of education activities and content. Carefully designed education activities that require learners to draw on their workplace context and relate it to the course learning will be required. The focus of learning should therefore draw on the learners context and work situation and relate this to the broader theoretical ideas rather than theory being imposed into the learners' context. For example, learners could be asked to examine an environmental risk in their workplace and the agricultural learner may study the problem of soil degradation, while the local government learner may study waste management problems.

Context is not limited to socio-cultural features as there are also structural features of context. The recommendations related to the structural context of the learner will be discussed under the next recommendation.

6.3.2 Dealing with structural factors

Recommendation 2

The EETDP curriculum should take account of a diversity of structural factors that may influence the potential agency of the learners in different workplaces.

Examples of structural factors that could be taken into account include (see section 5.4):

- epistemological frameworks, or ways of understanding environment and education, and ethical orientations that are seen as valid in each context (see sections 5.2.2, 5.2.3, 5.3 and 5.4),
- workplace habits and traditions (sections 4.2.4, 4.3.4 and 5.4),
- the institutional structures or ways in which personnel and activities are organised into different departments and disciplines (sections 4.2.4 and 4.3.4),
- the management structure and workplace hierarchy (sections 4.2.4 and 4.3.4),
- workplace policies and operating procedures (sections 4.2.4 and 4.3.4), and
- environmental and educational legislation, policies, standards and principles (sections 2.2.1.2, 2.2.2.2, 4.2.4 and 4.3.4).

These structural factors will have implications for the design of the EETDP materials and course activities. For example, the way that knowledge and content are dealt with will need careful consideration. The materials and education activities should balance the critical probing of the learners' own understandings or epistemologies of environment, education and ethical orientations with environmental and education content/theory. This critical probing and analysing should aim to help the EETDP learners to consider the implications of their understandings of environment and education on their education practice and in relation to solving environmental problems. A reconciling of ambiguities would also be necessary in the curriculum activities. For example, learners in a local government context could be encouraged to critically examine the emphasis on environmental management and education that focuses on technical knowledge about environmental problems being transmitted to learners. A learner from a local government context may be constrained by the structure of his/her epistemological frameworks and so will have limited agency to adapt or change educational practices in their workplace. The research findings indicated that in both nested cases there was ambiguity in the understanding of environment and education. As discussed in sections 5.2.2 and 5.3, this ambiguity seemed to be a result of practitioners drawing on different forms of knowledge in different situations. At times, there appeared to be a contradiction between their formal views and understandings, informed by more theoretical or differentiated knowledge, and more contextually situated views and understandings, informed by less formal or 'common-sense' ways of knowing. The EETDP qualification can enable agency by encouraging learners to become conscious of a range of different epistemologies related to environment and education by encouraging an inter-epistemological dialogue (Beck, 1992) that supports learners to critically examine the appropriateness of different forms of knowledge and educational orientations in different situations in their context (Scott & Gough, 2003). It is suggested that the education orientations and epistemological assumptions made in the EETDP curriculum also be

made explicit throughout the materials and during education activities to enable learners to relate learning on the EETDP qualification to their own contexts and practice.

This discussion has focused on epistemological frameworks as a form of structure. The EETDP materials and learning activities should encourage a similar critical examination of the other structural factors listed above. These structural factors will differ in each workplace context as seen in section 2.2 and chapter five and so the EETDP materials and course tutors could provide guidelines and responsively support the learners to investigate and analyse the structural factors in their own contexts.

6.3.3 Considering structure/agency and developing reflexivity

Recommendation 3

The EETDP curriculum should take into account the interplay between structure and agency, and the role of reflexivity in enabling and constraining agency.

One of the purposes of the EETDP qualification is that it should enable environmental education practitioners to contribute to environmental change through education (see section 1.2). In taking structural factors (described in section 6.3.2 above) into account, the EETDP curriculum should pay careful attention to the role of reflexivity in enabling agency. As discussed in sections 5.4 and 5.5, the enabling or constraining powers of structures such as those listed above are not only in the structures themselves. Their power to enable or constrain agency are also related to the intentionality of the agent. Reflexivity is the means through which an agent can critically respond to the structures in ways that can either transform or reproduce the structure and/or its enabling or constraining power. With social and environmental transformation as an intended outcome of environmental education, the EETDP curriculum could aim to strengthen the reflexivity and agency of learners.

There is evidence of reflexivity in relation to practice in both the nested cases in this study as discussed in chapter five. The examples of reflexivity in practice involved practitioners in these cases consciously ignoring structures such as a workplace policy or consciously developing new structures such as an environmental forum. In all the examples, the characteristic feature of the structures that were reflexively responded to is that they are formal and visible. In order to develop the reflexivity of learners, the EETDP curriculum should start by dealing with reflexivity in practice where the concept of reflexivity can be grappled with and discussed in relation to easily identifiable and understood structures. As noted in chapter five,

reflexivity in relation to education was less evident in the two nested cases. A possible reason for this is that the structures related to education are not very formal or visible and are often of an abstract nature such as epistemological frameworks and the assumptions, habits and traditions of educators. The lack of reflexivity of educators in responding to these structures is likely a result of their unawareness of these structures in the first place. By paying careful attention to these less visible structures as discussed in section 3.3.2 and then supporting reflexivity at the level of practice, the EETDP curriculum should then start to introduce and support reflexivity in education.

6.4 Critical review of the research process and recommendations for further research

The use of data from the curriculum workshops, although not contextually situated in any one particular workplace, provided the views and insights from a large group of environmental education practitioners and other role-players in the two contexts of the study. The broad nature of this data from the curriculum workshops contrasts with and compliments the data from the in-depth semi-structured interviews and document analysis of educational materials that provided a deeper and more nuanced view into the two nested cases.

When I consider the research aim and goals and reflect on the research methods that informed this study, I am aware that more data for this study could have been generated through, for example, additional interviews and workplace observations. Such data would probably have resulted in further insights and a deeper analysis in the study. However, the intention of this study is to generate *some* understandings, within the scope of a half thesis, that could inform the curriculum development work for the EETDP qualification. Also, given the theoretical and contextual scope of the study I was careful not to fall into a trap of 'data overload', and was therefore quite circumspect in assembling the data for the study. Within the confined scope of the study, I am confident that it will contribute meaningfully to the development of the EETDP curriculum.

What this study has achieved, is to provide 'tentative openings' for further enquiries that might explore in more depth aspects of epistemology, structure/agency and reflexivity in the context of curriculum development for workplace-based environmental learning that could potentially be reflexive and socially transformative. My recommendations for such further research include:

- Further interviews and careful observations of environmental education practitioners in their workplace contexts to provide insights from a larger number of practitioners in each context and a more detailed understanding of epistemology, structure/agency and reflexivity through triangulation of interview data with data from the observations.
- Interviews with a broader selection of staff (not only environmental educators) including, for example, managers and workers to gain better insights into the workplace epistemologies and structures.
- Consideration of additional contexts or nested cases in the research including, for example, the industry/business sector, the conservation sector and/or the civil society (environmental NGOs & CBOs) sector.
- Analysis not only of education materials from each context but also of the learning programmes of environmental education practitioners in each sector, which could also be complemented with observations of education and training processes.

The full EETDP qualification will be offered for the first time as a learnership, starting in April 2006. The recommendations from this research will be used to review the curriculum before the EETDP learnership starts and will be most useful during its implementation. Any future research as recommended above, if done in the context of the EETDP qualification, could be done during its implementation so that such a study would be even more closely situated in the broader EETDP context.

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Learnerships and skills programmes for sustainable development in the agricultural sector –

improving compliance with environmental legislation in agriculture

5 – 6 October 2004

Venue: Ascot Conference Centre, Pietermaritzburg

Compliance with environmental legislation such as the Conservation of Agricultural Resources Act (soon to be replaced with the sustainable use of agricultural resources bill) and meeting environmental standards such as ISO 14000 is becoming an important competitive advantage for commercial agriculture.

- What opportunities do the National Qualifications Framework and National Skills Act provide for accredited skills programmes and learnerships focused on sustainable development in agriculture?
- How does an agricultural enterprise respond to the challenges of sustainable development and compliance?
- Is compliance enough or is there room and need to move beyond compliance?
- Changes in environmental awareness and attitude are a good start but how do these start to translate into changed practice at every level within the farming enterprise?
- How do trainers, educators and extension personnel teach and train others in the light of the uncertainty surrounding many of the environmental issues and risks that are faced by the agricultural sector?

These are some of the questions being asked by a team of environment and sustainability educators who are developing accredited education and training courses for a range of sectors, including the agricultural sector.

Who should attend the workshop?

The proposed learnership and skills programmes are designed primarily for educators and trainers in the agricultural sector, whether NGO's, FET colleges, government departments, research institutes or private training organisations.

Attendance on the information workshop is also appropriate for farm managers and middle to upper management of large corporate farming enterprises, and government officials responsible for training of agricultural extension staff or any person who has a role in strategic planning or environmental management systems in their organisation.

[Register
Online](#)

Why should you attend?

- Get an in-depth understanding of how the learnership and skills programmes will help your organisation or enterprise become a leader in environmental compliance.
- Help shape the development of these courses to best suit your needs.
- Be first in line to enroll learners on these accredited learnerships and courses.
- As accredited courses, you will be able to make Skills Development Levy claims for training costs.

The learnership and skills programmes are based on the NQF level 5 National Certificate: Environmental Education, Training and Development Practice (EETDP).

Venue: Ascot Conference Centre, Scottsville, Pietermaritzburg

Times: 5th: 09h30 – 16h30; 6th: 08h30 – 13h30

Cost: No attendance cost, transport and accommodation to be arranged and paid by yourself

Jonathon Wigley, Wildlife and Environment Society of SA
P.O. Box 394, Howick, 3290, Tel: 033 3303931, Fax: 033 3304576
Cell: 082 8290652, Email: jj@futurenet.co.za

For bookings
register
online ([click
here](#)) or
contact:

A more detailed overview and rationale for the learnership and skills programmes is attached.

Appendix 2 – Critical questions developed at an EETDP curriculum development workshop

Critical Questions from the Curriculum development workshop for the EETDP qualification held at Umgeni Valley from 27 – 30 June 2005.

Feedback from agriculture group:

- What have been some of the main/recent changes in approaches to education globally? (AG-CQ1)
- What are the impacts of agriculture on the environment, positive and negative? (AG-CQ2)
- Who are the people (stakeholders) involved in your sector and how can/does education support them in their activities? (AG-CQ3)
- What is the role of education in your sector? (AG-CQ4)
- What form does education take in your sector – apprenticeship (practical), classroom (theoretical)? Theory-practice/practice-theory > praxis? (AG-CQ5)
- Are the education processes effective in your context? Why? Why not? What are the main challenges? (AG-CQ6)
- What should education be doing in your sector? (AG-CQ7)
- What might be the most useful approaches to education in your context? (AG-CQ8)
- What global environmental principles have been developed? How can these support your work in your context? (AG-CQ9)
- How can we balance the short-term interests of individuals with long-term interests of the community? (AG-CQ10)
- What is the role and responsibility of humanity on earth? Regarding people? Regarding the natural environment? (AG-CQ11)
- What are the main ethical issues related to:
 - Treatment of farm animals?
 - Production of healthy food?
 - Impact of their activities on the natural environment?
 - Treatment of employees? (AG-CQ12)
- What are the main ethical issues in your context? Regarding people? Regarding the natural environment? (AG-CQ12)
- Is a farmer responsible for the impacts of food production? On environment? On customers? (AG-CQ13)
- How do people understand ethics in your context? With regard to people? With regard to the natural environment? (AG-CQ14)
- What is needed for farmers to become more responsible as stewards of the environment and as producers of healthy food? (AG-CQ15)
- What are the main issues related to environment in your context? How are these issues understood locally? How are these issues being addressed? (AG-CQ16)
- What steps should a farmer take to protect the environment? (a) legislated; (b) farmer group; (c) individuals (AG-CQ17)
- Should farmers be legally liable if nutrients and poison from their farms pollutes air and water? (AG-CQ18)
- What are the most important aspects (dimensions) of environment in your context? (AG-CQ19)

Appendix 2 continued...

- How is environment understood locally? With regard to people? With regard to the natural environment? (AG-CQ20)
- How is environment understood globally? (AG-CQ21)
- What principles can guide ethical decisions? What global ethical principles are available? (AG-CQ22)
- Why do people become educators generally? Expert? Mediator? Facilitator? (AG-CQ23)
- What are the purposes of education globally? In your context? (AG-CQ24)
- What type of educational programme might be useful to help address environmental and ethical issues in your context? (AG-CQ25)
- What role can/should education play with regard to environmental and ethical issues in your context? (AG-CQ25)

Feedback from local government group:

- How can the practitioner improve communication/cooperation between 3 levels of government (cooperative government) on environmental education and training? (LG-CQ1)
- What is the public's perception of environmental education and training? (need political 'buy-in') (LG-CQ2)
- What does national legislation and policy say about citizens and environment? (LG-CQ3)
- What is the changing context in Africa, SADC and South Africa? What has already been done e.g. NEPAD, Batho Pele, etc? (LG-CQ4)
- Does local government have capacity to deal with the problem? (LG-CQ5)
- What is your municipality's perception of the role and style of environmental education and training? (LG-CQ6)
- What is the relationship with key stakeholders in local government? (LG-CQ7)
- What education/communication processes need to take place between local government and stakeholders e.g. industry, NGO, schools, etc? (LG-CQ8)
- How to work with respect and integrity with, for example, traditional leaders, ward councilors – follow protocols, respect rights, etc? (LG-CQ9)
- How can the practitioners be supported to identify and respond to contradictory or ethical (environment and education) dilemmas (at non-management level) in their work? (LG-CQ10)
- What does Agenda 21, LA21 and Tbilisi Principles imply for work in local government? (LG-CQ11)
- How do we understand and then address the challenge of population and natural resources (socio-ecological balance)? (LG-CQ12)
- What is the relationship between the natural environment and economic development? (LG-CQ13)
- How can inter-departmental planning/liaison/communication be supported to have more focused education and training projects? (LG-CQ14)
- What does national legislation and policy say about education (wider than just education legislation)? LG-CQ15)
- How can the course equip the practitioners to adapt/re-present information in contextually appropriate ways (at level 5)? LG-CQ16)
- How can the course equip the practitioner to select/critique/source appropriate information and resource materials to communities? (LG-CQ17)
- What are the rights and responsibilities of citizens with regard to a healthy environment? (LG-CQ18)

Appendix 3 – Transcription of local government semi-structured interview

Interview transcription – Ekurhuleni Municipality on 29 November 2005

Interviewer: Jonathon Wigley - JW
Respondent: Jane (not her real name) - LR

JW: Right, tell me what is your job title?
LR: I am an Environmental Officer – Environmental Education and Awareness in Ekurhuleni.
JW: In your view, what is the environment? How would you define environment?
LR: The definition of environment is err ecosystems, different species, plants, animals...
JW: And how have you come to understand... what has shaped your understanding of environment? I'm sure over time your understanding may have changed...
LR: It is through my studies.
JW: What were your studies?
LR: Initially it was environmental health, diploma in environmental health.
JW: OK, and in your view, what are the main environmental issues or problems in your work... so in other words the Ekurhuleni municipal area?
LR: The main issues are err we have the problem of waste because, because historically there were riots and some sort of protests against the municipalities and in the townships most of the services were stopped. They just couldn't go in there so people started to develop that sense of dumping waste and somehow that has continued with the waste...
JW: And what are the impacts or results of that problem, of dumping?
LR: Mostly its unsightliness but then with regard to health...health implications, the approach was to move the waste away from their premises because of the smell and all that but there isn't as much err environmental impacts.
JW: Lets go back to what you said earlier, it was during the time of apartheid so you...
LR: Mmmmm, ja, it goes back, ja...
JW: So that is sort of... almost like a habit that people have from then...?
LR: A habit, yes, because before then we didn't have any waste in our yards, our open spaces were clean, there was... But after that, you know, you find tension between communities and municipalities... Because there was no proper collection so people find the open space and just dump it there, so parents were sending kids to go dump and as you grow old you think that way...
JW: OK, then in terms of the waste management system of the municipality itself, are there any issues there in terms of the actual management of the waste?
LR: Yes, there is a issue of waste and the municipality has said that it will close some of those dumps, not all of them and err...they do check on them, most of them do have recycling...
JW: So the waste is collected first then sorted out...?
LR: Sorted out... even though you have your...some business premises do have service providers that separate the waste from the source.
JW: Are there any other issues you can think of other than waste in this municipal area?
LR: Yes, because of the industry we have a lot of pollution, air pollution and a problem with mine dumps...
JW: What is the problem with mine dumps?
LR: It is mostly the dust...
JW: OK, we've got waste, air pollution, mine dumps, are there any other problems?
LR: Ummm...water pollution is there but it is not that much as compared to the others.
JW: OK, can we come back to this, the next question is a bit more tricky, what would you say is the underlying cause of some of these problems? So for example you have already given me an underlying cause of the waste in the townships, you've said that is the history of apartheid and the lack of service delivery and so on...but some of the other problems?
LR: You know that with the air pollution, err you know some of the blacks come from the surrounding areas especially around new sites there is still a lot of coal being used as a source of energy and because of that err...
JW: For domestic energy?
LR: Yes and so that is still being used and causes air pollution.
JW: So from an economic point, it is a lot cheaper for people to use coal, much cheaper than using electricity for example?
LR: And there is no infrastructure for electricity in some of the areas.
JW: Any other causes? Are there factories that are causing air pollution too?

Appendix 3 continued...

- LR: Ja, in fact they cause air pollution too and you know with the mine dumps there are a lot of mine dumps and it causes problems. Some of the mines close and they are not rehabilitated.
- JW: In terms of legalities, are mines not compelled to clean up and rehabilitate after their operations?
- LR: Yes, but this is under the hands of the department of mineral affairs and energy.
- JW: So, they are responsible for enforcing...
- LR: For enforcing the legislation, yes.
- JW: OK, and if mines don't do rehabilitation, can the department of environment affairs and tourism, can they do anything?
- LR: Only the national department...
- JW: This is sort of leading us on to the next question which is; how do you see some of these issues being solved? If we start with the waste, what solutions can you see for these issues?
- LR: What can be done is that... around the mindsets of the people. I don't know...through environmental education we can change... try and promote recycling issues, especially try and start recycling cooperatives where we get communities to separate from the households and thereafter they can collect from the houses and through that we will sort of minimize the waste.
- JW: You were saying one thing will be environmental education... recycling, minimizing waste, are there any other solutions you can think of or we could move onto the other problems so the industrial air pollution, mines and dumps...
- LR: Now let me ask with regards to the institution responsible for the enforcement of legislation, because there is the new air quality bill, who is the institution responsible for the enforcement of that... I am not too sure.
- JW: OK, if the responsibility for the enforcement lies with provincial or national departments, is there any role for local government that you can see in terms of legislation?
- LR: Yes but... but then maybe they could exert pressure you know on national government...
- JW: So there needs to be some sort of communication between local, provincial and national departments?
- LR: Yes
- JW: Ok and then what role would you see on the ground level for local government, how do they influence the provincial and national departments? Are their 'on-the-ground' things that can be done?
- LR: Yes, it again goes back to environmental education and public consultation because what we have now started to do with regard the new developments, we have got an environmental forum...and we are trying to get the communities to participate in the EIA processes especially where they will say there is a development which is not far from the mine dumps, we get them to participate and add their views with regard to that particular development so that at the end they don't say why is this going on...
- JW: Ok do you also feel the need for...for example if we look at the waste management issue, is there a need for any ... the environmental education you have mentioned so far is for members of the public, is there any need for training and education for local government officials as well, not only officials but right down to the workers who are working with waste issues?
- LR: Yes that is what we planned for... for the training and capacity building for the employees we are already started with that because what we are planning to do as well is ... because we are not actually recycling our waste enough and we have started with the recycling of our waste and training our employees on that.
- JW: Ok, another example for me that would come to mind is the planning of new developments, it might be a low cost housing area or a new industrial complex or whatever. The people in local government who are responsible for land-use planning is there any environmental concern taken into account during that planning?
- LR: Yes what is happening is when reports are being drafted for such developments, whether by the private sector or by us, we usually circulate to all these departments and as an environmental department we usually put our comments, looking at the environmental side of it, you know; this needs to happen... It might be waste it might be energy, it might be...you know, all environmental aspects that must be considered and we add our comments.
- JW: Ok, lets move to the next question, what existing environmental education and training is taking place in your work context? What type of environmental education programmes are you involved with?
- LR: We do environmental capacity building for...we have actually started, we have started on a small scale for our employees but that has not kicked off nicely as yet but we are getting there. And then environmental education for community members especially our environmental forum members, our NGOs, environmental NGOs and the rural community members and our ward committee members, those are the structures we need to work with. And we also have environmental education for schools we have got environmental education centres where we send schools for lessons and we also do field trips but usually when we do that its through certain competitions that we are running and included in the prize is a field trip for the learners
- JW: To a nature reserve or...?

Appendix 3 continued...

- LR: Nature reserves, our weather station, our water management centre and then environmental education that we do at our environmental education centres as well. Community members do go there but then its sort of coordinated by this department for community members to go to those centres and learn something from there and then we also have overnight fieldtrips for community members not only for schools also community members.
- JW: How many education centres do you have?
- LR: At the moment the one that...they are not actually occupied by the department, the one that I am talking about is a sort of a trust, it is run by the trust that we are members of and then we've got different environmental centres even though they are not... I think in this area we've got 3 or I think its 4, four environmental centres... but we are in the process of establishing each centre.
- JW: You mentioned that the internal capacity building of staff you said hasn't been kicked off properly yet is there any reason for that?
- LR: Not as yet because we are still busy with the planning strategy.
- JW: Ok if you had to summarise the broad purpose of environmental education, what is the broad purpose of your environmental education programmes?
- LR: That is to make people aware of what environmental management is, when we talk about environmental management what is it that we are talking about? Are we talking only about parks or waste, things like that...? But we want them to be with us on that, to know what that concept is all about and to make them start practicing and through environmental management and behaviour and get them to change their mindsets so they start behaving as environmentalists.
- JW: And more specifically now, are there specific aims and objectives for your programmes?
- LR: What do you mean objectives?
- JW: So, of your environmental education programmes, what are your aims and objectives? You've mentioned the broad goal which is for people to understand better what environmental management is and to change their behaviour, the goal is almost like a mountain in the distance, what steps do you need to take to get there?
- LR: What we are actually planning as the department of environmental education, we as a department, environmental education has been done over and over again but what we want to do now is sort of formalize it. So, people at the ground know that institutions do offer that but you don't get everyone to go to institutions so what we want to do is have it formalized and get accredited and get recognised programmes (recording interrupted by cell phone interference)...
- JW: You've mentioned partnerships with the participation of the communities, why do you see that as important?
- LR: Without them there is nothing you can do. You can go there and implement a programme that you did on your own in your office and at the end of the day you wont have an impact, it is going to go down.
- JW: Ok so in terms of the education that you do itself... you have a participatory approach to the way that you approach communities and work with them. In terms of the courses that you actually run, once you are running an environmental education programme or course or activity do you have participatory methods that you use there... to make sure people participate?
- LR: Yes we do
- JW: Can you think of an example?
- LR: We've got the past program which we use .I cant remember... participatory... something like that and what we actually want to implement now is a sort of training of trainers programme because what we have now realised is that we have people, community members who are really committed to environmental management and we want to train them so that they can change others as well and then through the forum, these are the people that we work with most of the time because they have been participating with the community members, so we actually train them. Once we developed a sort of document in the department and workshopped it with them so they know what is in the document like when we did our air quality management plan we actually workshopped it with them so we can take the message there so they know there is this plan this is our responsibility as a community and this is what we want to achieve.
- JW: You've mentioned quite a range of different environmental problems and some of the education programmes that you are involved in coming out of the strategy and so on... but obviously education is one part of a much more complicated world so what would you say the role of education is in terms of solving problems?
- LR: The role of education?
- JW: Ja, so how does education contribute towards solving the problems in the long term?
- LR: Ja, most people they do things because they are not aware they are not learned about that so once you educate them then you capacitate them. You give them information for them to be able to use so that is how I see the

Appendix 3 continued...

role of environmental education when you capacitate someone who doesn't have any knowledge about the field and doing that that you are making a better person than what she was...

JW: And do you think that sometimes the people themselves are not ignorant? We often assume people are ignorant and we think that giving them information will help. Do you think sometimes the people themselves might have the knowledge that whatever they are doing is wrong or not sustainable but sometimes there might be other constraints or issues so maybe we need to work with people and their own existing knowledge about the issues? So, for example, people might know very well that there is air pollution because of the burning of coal but in terms of the economic situation of that person they can't afford electricity, they need coal for heating and cooking and so on. I think often environmental problems are not so much that people are not aware but that the situation they are caught in, they are trapped in that situation. Do you think there is a role that education can play to deal with issues from that point of view?

LR: Some of them are aware and some of them are not, but we can see from the response that we get from them that some of them are not aware but then some of them are aware but they don't have any alternatives so it's a two way... they are aware and we give them even more information and... To say that you are aware but you are not doing it we must get the reasons why they are not doing it. It might be economical reasons but then you need to come up with alternatives to that. Like the using of coal, you know, we do come up with other alternatives like instead of using coal you can use this as an alternative even though of course it takes time for them to change from what they have been using to something else but then we need to show them the positive side of changing from using whatever it is they have been using.... But then for those that are not aware you can see them get excited that "ohh... this is how we can benefit from this...this is how we can actually save and alleviate poverty. If we can use this alternative source of energy instead of electricity than our electricity bill will come down and be able to utilize the money for something else." But then they are frustrated because sometimes you get an environmental group that is active and want to utilize a certain space for greening, gardens and all that but then they can't get hold of the space from private companies or the municipality and for them to get access to that land is quite difficult so it has limitations.

JW: Ok before we move from education, I would like to take some examples of your learning programmes or workshop programmes for me to take back with me to go through. What are examples of the things that you teach in your environmental education programmes? Maybe you could give me examples of some of the activities you do on your programmes...

LR: We have a lot of wetlands in our region and during our world wetlands day we do workshops on wetlands. We inform the community what wetlands are and how we as communities benefit from them and that is a sort of participatory type of workshop; they are telling us what they think could be the solution with regard to the maintenance of the wetlands and how they utilize the wetlands. You know the wetlands are not big enough they have been there for some time but they are not aware that these are wetlands and go there and do all sorts of rituals in the wetlands and not that they need not to but they need to understand how they can benefit from them (phone call interrupts us)

JW: The next question is quite specific, if we stick to the example of wetlands, what are the learners expected to know and/or do after your environmental education programmes?

LR: You mean the wetlands?

JW: You can use that as an example or any other programme...

LR: You know the problem with the wetlands is you get development next to the wetlands like mining and.... what we wanted, the information we wanted to get to them is that they must be able to identify what a wetland is and must be able to, especially those staying around the wetlands, be able to protect the wetlands and from that... Because we also have reeds in the wetland and when they want to cut them they can be able to sort of utilize the reeds for some handiwork and be able to sell them and get something from that.

JW: OK, do your education programmes help develop the ability of the learners to respond to new problems or situations?

LR: Yes we do, the type of training you are talking about is actually their responsibility, to give their problems and get solutions to these problems.

JW: If you had the time and resources what would your ultimate vision for environmental education in Ekurhuleni municipality be?

LR: The vision would be to help the community... in the workplace and the general community, to start to practice environmental management and activities and... Because from here you go home and you sort of continue with those practices... and it's just that you do environmental education and you also depend on other departments as well, you go out of here and find some dumping on the pavement that should not be there and then you got the other departments that need to submit notice on the owners of that private property to remove whatever is on the

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- pavement and sometimes it does not happen and you expect someone to walk out of this office past that rubble on the pavement and you expect them to be motivated with these environmental issues... it creates quite a problem. It's the same as school kids you know at school you learn certain things but at home it's something different so if you can help everyone you know...
- JW: So you see everybody in the municipality having that vision and being able to contribute in their work to that vision?
- LR: Yes.
- JW: The next few questions are about some of the challenges or problems that you face in terms of the work of your department or your environmental education section, but before I look at the challenges facing you, what are the challenges facing the people you are working with in your education programmes. So you are looking at introducing changed behaviour in terms of sustainable living, what are the challenges preventing people from making those changes?
- LR: You know most of the groups that we work with are unemployed and we call them to meetings, we call them to workshops they will say they do not have money for transport, they do not have facilities, even if you say we can get one guy and say there is a meeting on such and such and if he can be able to inform the others but then they don't have access to telephone so he cannot get the message to the other people. And the other challenge is the level of education because you get the older ones who are actually interested in environmental issues and the younger ones have other interests and the level of education of the adults is not high you know..
- JW: Any other challenges?
- LR: Like I said that, you know, we need have facilities that we want for environmental projects in the community...
- JW: So like lack of land...
- LR: Lack of land, lack of resources, you might have land but don't have resources...
- JW: What are the main challenges facing you and your organisation? So in other words, in this environmental education section, what are the main challenges in terms of you developing and conducting your environmental education activities?
- LR: It goes back to finances because like I said they don't have transport in fact and to provide transport is quite a challenge for us and there are people that are interested because they are unemployed and think they can make money out of it in the long run and seeing that they don't they just give up. And the other thing is the staff compliment because you know we go to the communities and go back until they get off the ground and sometimes we don't actually manage...
- JW: So you don't have enough staff in your section?
- LR: I don't think we do ... because for the projects we need to have time for consultations...
- JW: I am going to ask more specific questions now about the organisation. If you take sustainable development as a broad objective for Ekurhuleni municipality what are some of the main challenges for change towards sustainable development in this municipality? So in other words... sustainable waste management, sustainable land-use planning, all the issues we have spoken about already in terms of the communities, the pollution and so on... Now I am looking not at the problems outside of the organisation I am looking at the problems inside the municipality itself so for example there might be legislation, there might be policies that are hampering the way that environmental education and sustainable development can happen, there might be reporting structures or job descriptions that are maybe inadequate. There might be finances as you have already mentioned. It might be because of the way the organisation is structured in terms of different disciplines and departments not talking to each other and then also less formal things like workplace culture, politics between staff, protocols and so on. These are examples and are there any that you can think are a challenge in terms of environmental education and education for sustainable development in the municipality?
- LR: Some of them you have already mentioned like interdepartmental agreements and communication between departments that I see lacking and that is because of the way the department is structured at the moment because you have everyone in this department, even though environmental management is a cross-cutting thing in our department but then there is no communication between these departments you've got this department dealing with EIAs and that department on environmental plans and some of the information comes through and some don't and the way that it is structured is the main problem because we have a lot of strategies and policies and all that...
- JW: And those, if they were implemented do you think would be quite good?
- LR: It would be quite good and if they really could talk to each other...
- JW: So you think there is good policy, so policy is not a barrier, there is good policy but it's actually the way that it is...

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- LR: The way that is structured in this department yes, because we have the environmental management framework which asks for a special development plan within our department but then so much is... you know...
- JW: And in terms of the less formal things? So things like workplace culture, workplace work functions and that, is there a good ethic of environment and sustainability?
- LR: It differs from department to department but generally... and from individual to individual you know, like us here as a department could help with environmental consciousness, but we still get people you know who are not conscious, even if you are not in the office they still leave the lights on. You go back home and still their lights are on we gave them this circular you know they are not using it some of them.
- JW: And if I went for example to the planning department and I spoke to one of the land-use planners, say someone who is planning a new development area. Would they have any environmental consciousness or is it likely that that person wouldn't even be thinking about environmental issues when he or she is planning the development?
- LR: Its like I've said, it differs from person to person you can get someone who is conscious but for others for them its not much of a problem...
- JW: And what would you say is a solution, for example you've mentioned the lack of communication or lack of integration between the different departments. How do you think these problems can be solved and is there a role that environmental education can play to solve these problems, internally?
- LR: Internally I think, ok one that can solve these problems is the restructuring of these departments, you know, put your environmental sections in one department and within that department try and ensure that you start, understand what one is doing and you try and compliment each other and yes, environmental education... I think we can play a role in that and starting from our top management, of course, you know filtering down but then you also need to get their support and workshop them on certain aspects about environmental management and if you don't get their support then obviously it wont filter down.
- JW: So you think having all the environment in one department, some people will say that environment needs to be split up and included into all the departments so that everyone from the engineers to the technicians to the waste management to the workers down... the finances... there is an argument that environment, because it is cross-cutting needs to be in all the departments and you are suggesting why don't you have environment all together because the danger for me is that if you have environment all in one department then everyone else carries on operating without thinking about environment and the environment section itself can become isolated from the rest of the operations, do you think there is a danger of that if it were restructured in that way?
- LR: You know there could be a danger if it were clustered into one department but then you look at their responsibility, the level of their responsibility will sort of guide you on where to put this, on which environmental responsibilities will be clustered together and which can be distributed to other departments but you are still communicating to the broader department because you need to ensure that the smaller departments can do whatever they are supposed to be doing guided by the policies or strategies that you might have for you to be able to oversee that they are doing the right thing.
- JW: And it would need to have some clout in a way... so that department do you think it would need to have almost like a 'big-stick' authority?
- LR: That is what I am thinking... you need to have this department overseeing the other departments that have a smaller portion to play with regards environmental management because some of these departments don't see environmental management as their core function its something small within their department but then the bigger department will have to ensure that the other departments consider that. Just like safety, in each department we are all doing safety but then there is a specific department that deals with safety issues and ensures that we as departments are actually complying with what is required, so that is how I see it with environment.
- JW: And what would you say would be the role of education now? Because obviously the policy and legislation is already there, what for you would be the role of education to generally get more compliance and more sustainable practice throughout the municipality in all departments?
- LR: Our role will actually be to ensure that management understands what environmental management is and what the role of the departments are with regard to environmental management and what their responsibilities are as management of the organisation, to ensure that everyone is actually participating ... And to also win their support instead of relying on other people to do that but then I think it is our role to ensure they are also capacitated you know. Talking about the state of environment report they might be sitting up there and not knowing the contents of the state of environment report and we are also dealing with politicians so it is also our role to conscientise the politicians on what environmental management is.

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- JW: Are there any questions or comments that you have for me; is there anything else you would like to add that I have not asked?
- LR: I think that I have mentioned... I have mentioned most...
- JW: What would you see the role of the EETDP learnership, I know this municipality is interested in having learners on it, what would the role of those learners be? For one would it be existing employees that do it or would you get active community members or unemployed people to do it or would it be both? And then what do you think is the role of the learnership in this municipality?
- LR: OK what we have planned is to take 2 existing staff members and three from outside, the criteria from outside will be, mostly we want NGOs that are working with environmental issues, because you don't want someone who is not really interested in environmental issues so you want someone who has an interest. There are those that did conservation but then did not complete their studies or did something not environmental, people like that are people we will consider especially from outside and the benefit for us you know with environmental education if we can be able to educate everyone and anyone with regard to environmental management. So they are getting people participating on the learnership, its sort of we are spreading our wings even if at the end of the day we as this organisation we don't employ them but at least have got the knowledge on environmental education and somehow having that skill to be able to take the message forward and in that way we will be reaching more people.
- JW: And the two internal people have they been identified already?
- LR: Yes they have been identified.
- JW: Through an internal selection process?
- LR: Not yet, just by the executive manager and having four people working under her, she actually did a sort of assessment that this person is new with the department and she did an environmental management diploma and based in the environmental education section she will need to have more knowledge about environmental education and the other person is from the education side, from formal education – she was a teacher so she needs more on the environmental side.
- JW: Thanks very much for your time.

Appendix 4 – Examples of categories and subcategories developed for the agricultural nested case

Agricultural Sector Analytic Categories & Sub-categories

Analytic Category 1 – Epistemology/knowledge related to Education

Sub-categories	Data	Code
Orientation to/ purpose of education	Workshop critical questions:	
	• concern about role of education – how is education understood?	AG-CQ4
	• effectiveness of education and reasons for this	AG-CQ6
	• approach/orientation to education	AG-CQ8
	Workshop Needs Analysis:	
	• education and training theory	AG-NA6
	Semi-structured interview:	
	• training for sustainable agriculture is informal, modules with pictures as some farmers are illiterate, mostly practical, not theoretical, say and do at the same time	AG-SS10
	• purpose of education for sustainable agriculture is to enable farmers to stand on own feet & take initiative/responsibility, not just wait for extension officers	AG-SS29
	Document analysis of education material	
Context	• technician and farmer to number and measure the land	AG-DA2
	• technician to determine soil depth, record measurements and production practices of previous season	AG-DA2
	• after receiving results, technician to talk on maize production & give advice on lime, fertilizer & seed needed (type & quantities)	AG-DA3
	• take soil samples and send to Cedara with payment	
	• suitable varieties or cultivars to be recommended by technician, always state size you require	AG-DA3
		AG-DA6
	Workshop Critical questions:	
	• concern for contemporary changes in education	AG-CQ1
	• form of education: apprenticeship or classroom	AG-CQ5
	• global and local influences on purposes of education	AG-CQ24
	• global influences on educators	AG-CQ1
	• context (experiential/ways of knowing)	AG-CQ8
	• global environmental principles to support environmental education in context	AG-CQ9
	Workshop needs analysis	
	• contextualising education e.g. communication methods and demonstration	AG-NA6
	Semi-structured interview	
	• some of work is educational e.g. in-field training but also send farmers to external trainers	AG-SS21
	Document analysis of education material	
	• do you need to buy lime, fertilizer, seed?	AG-DA1
	• If farmer not want to apply fertilizer in planting furrows or with planter, broadcast fertilizer	AG-DA4
	• Maize can be planted by hand, ox or tractor-drawn planters	AG-DA5
	• When using purchased fertilizer, use hybrid seed, buying in bulk and sharing is cheaper	AG-DA5
	• The month of harvesting will be determined by the type of maize: open-pollinated or hybrid	AG-DA9

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Role of educator	Workshop critical questions	
	• education support for participation	AG-CQ3
	• role of educators/approach to teaching: expert – mediator – facilitator	AG-CQ23
	Workshop Needs Analysis	
	• use of learning support materials	AG-NA6
	Semi-structured interview	
	• role of extension officer in solving these problems is training, this is integral part of extension – making sure things are done well	AG-SS8
	• extension officers are trained in sustainable agriculture but mostly send farmers to external providers is farmers want this – are needs driven & if farmers request permaculture they are encouraged to do both (i.e. also conventional) & compare	AG-SS18
	• for ongoing staff development, staff choose according to interest, typical courses include crop, vegetable, poultry, livestock & hydroponics production	AG-SS20
	• some of work is educational e.g. in-field training but also send farmers to external trainers	AG-SS21
	• approach to education: must understand farmers & their level of education	AG-SS22
	• also, use mother tongue (Zulu) if farmers have low education, English ok for youth with matric	AG-SS22
	• role of teacher is to ensure message is understood, not just talk but ensure there is understanding e.g. ask questions, use pictures & allow learners to explain	AG-SS23
	• also, if learners go wrong must be corrected	AG-SS23
	• important that the educator knows the topic, not all are experts therefore can draw on other extension staff especially for functions such as farmers days	AG-SS23
	• learners often know a lot already, you must know your topic or else you will get caught out	AG-SS25
	• important to make learners think in class and in the field e.g. they can do a play	AG-SS27
	• also, learners must feel free, need to create atmosphere where even shy people can participate e.g. fun activities	AG-SS27
	Document analysis of education material	
	• technician and farmer to number and measure the land	AG-DA2
	• technician to determine soil depth, record measurements and production practices of previous season	AG-DA2
	• after receiving results, technician to talk on maize production & give advice on lime, fertilizer & seed needed (type & quantities)	AG-DA3
	• suitable varieties or cultivars to be recommended by technician, always state size you require	AG-DA6
	• or apply herbicide with a knap-sack or tractor sprayer on same day as planting – ask for assistance from technician, read instructions, calibrate properly	AG-DA8

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Role of learners	Workshop critical questions	AG-CQ3
	• education support for participation	
	Workshop needs analysis	AG-NA6
	• use of learning support materials	
	Semi-structured interview	AG-SS11
	• training for commercial farmers (in sustainable agriculture) not needed as they are more established, can be given modules to use themselves	
	• extension officers are trained in sustainable agriculture but mostly send farmers to external providers is farmers want this – are needs driven & if farmers request permaculture they are encouraged to do both (i.e. also conventional) & compare	AG-SS18
	• role of learners must be participatory process, give them work e.g. topic to discuss then report back, this allows educator to gauge understandings	AG-SS24
	• first allow learners to explain their ideas then educator can take it from there, encourages participation	AG-SS24
	• learners often know a lot already, you must know your topic or else you will get caught out.	AG-SS25
	• participation important so learners don't get bored, better if they exchange ideas	AG-SS26
	• important to make learners think in class and in the field e.g. they can do a play	AG-SS27
	• also, learners must feel free, need to create atmosphere where even shy people can participate e.g. fun activities	AG-SS27
	Document analysis of education material	
Role of content/ knowledge/ materials	• technician and farmer to number and measure the land	AG-DA2
	• take soil samples and send to Cedara with payment	AG-DA3
	• if farmer not want to apply fertilizer in planting furrows or with planter, broadcast fertilizer	AG-DA4
	• investigate to ensure seeds are planted properly, planting is the most important activity, do it properly	AG-DA6
	• as an indicator of when to harvest, look at the base of the maize pips	AG-DA9
	Workshop critical questions	
	• how education helps address environmental and ethical issues	AG-CQ25
	Workshop Needs Analysis	
	• use of learning support materials	AG-NA6
	Semi-structured interview	AG-SS10
	• training for sustainable agriculture is informal, modules with pictures as some farmers are illiterate, mostly practical, not theoretical, say and do at the same time	
	• training for commercial farmers (sustainable agric) not needed as they are more established, can be given modules to use themselves	AG-SS11
	• content for commercial farmers is soil testing, taking soil samples	AG-SS11
	• for ongoing staff development, staff choose according to interest, typical courses include crop, vegetable, poultry, livestock & hydroponics production	AG-SS20
	• also, use mother tongue (Zulu) if farmers have low education, English ok for youth with matric	AG-SS22
	• practical activities important e.g. if training on cabbage planting, must do it, ensure equipment is available	AG-SS28
	Document analysis of education material	
	• crop rotation	AG-DA1
	• disc or deep plough land the next day to incorporate lime and fertilizer	AG-DA4
	• never mix kraal manure, fertilizer and seed when planting by planter	AG-DA6

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Analytic Category 2 – Epistemology/knowledge related to Environment

Subcategories	Data	Code
Understanding of 'environment' and 'sustainability'	Workshop critical questions	
	• global environmental principles – understanding of environment	AG-CQ9
	• local understanding of environmental issues	AG-CQ16
	• dimensions of environment in context	AG-CQ19
	• local understanding of what environment is	AG-CQ20
	• global understanding of environment	AG-CQ21
	Workshop needs analysis	
	• knowledge of ecological & environmental systems/principles	AG-NA1
	• critical habitats & ecological processes & patterns	AG-NA7
	• carrying capacity thresholds	AG-NA9
	• disturbance ecology	AG-NA11
	Semi-structured interview	
	• environment is everything available, especially something grown e.g. timber, vegetation, dams, soil, crops, everything around us	AG-SS1
	• understood this way because when grouped together these are environment, also through studies: agriculture diploma	AG-SS2
Environmental Issues/risks	• not many environmental problems with commercial farmers	AG-SS4
	• sustainable agriculture is implementing community projects, planting different crops, ensuring that it doesn't end & that they produce all year round supported by irrigation, fencing, everything.	AG-SS9
	• sustainable agriculture is to ensure inputs are used effectively & that people will benefit from this for a long time, not something that ends, is continuous	AG-SS13
	• conventional agriculture is sustainable and now are introducing new method: no-till planting that involves spraying field with roundup & burning off vegetation before planting without turning soil	AG-SS14
	• permaculture requires no fertilizer or chemicals, well decomposed compost must be used and this requires intensive training as you cannot measure how much to apply whereas fertilizer easy to calculate based on soil tests, also large quantity of compost needed	AG-SS16
	• opinion of permaculture: good method as no waste, don't have to buy fertilizer as make own from manure & e.g. companion planting onion & cabbage keeps out pests but needs good training	AG-SS17
	• on a large scale (more than 1 hectare) permaculture is not possible – needs too much compost & pest control is difficult	AG-SS19
	Workshop critical questions	
	• negative impacts of agriculture on environment	AG-CQ2
	Workshop needs analysis	
	• littering	AG-NA15
	• alien vegetation	AG-NA16
	• unsustainable harvesting	AG-NA17
	• uncontrolled ploughing	AG-NA18
	• hunting	AG-NA19
	• wetland destruction	AG-NA21
	• mono-cropping & erosion of biodiversity	AG-NA23
	• genetic engineering and contamination of seed	AG-NA24
	• equity issues	AG-NA25
	• food quality issues	AG-NA26
	Semi-structured interview	
	• main environmental issues are soil erosion, alien weeds extract water, cause dams to dry	AG-SS3
	• also lack of markets/marketing, farmers don't understand these things	AG-SS4
	• climate is environmental problem, e.g. rainfall differs and if no rain after planting is a problem, floods also cause problems	AG-SS5
	• conventional way (with ploughing) causes nutrient loss through exposure to sun and evaporation – you can see difference with no-till method	AG-SS15

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Causes	<p>Semi-structured interview</p> <ul style="list-style-type: none"> underlying causes e.g. camps not divided causing animals to roam freely and overgraze underlying this is culture – people like keeping cattle & goats 	<p>AG-SS6</p> <p>AG-SS6</p>
Solutions	<p>Workshop needs analysis</p> <ul style="list-style-type: none"> sustainable agricultural practice e.g. permaculture sustainable farming soil management wetland rehabilitation water conservation raptor and predator conservation and management <p>Semi-structured interview</p> <ul style="list-style-type: none"> solutions include better management e.g. using burning to control grazing if fencing not possible conventional way (with ploughing) causes nutrient loss through exposure to sun and evaporation – you can see difference with no-till method 	<p>AG-NA3</p> <p>AG-NA10</p> <p>AG-NA20</p> <p>AG-NA21</p> <p>AG-NA22</p> <p>AG-NA28</p> <p>AG-SS7</p> <p>AG-SS15</p>
Legislation	<p>Workshop: Critical Questions:</p> <ul style="list-style-type: none"> guidelines provided by legislation & farmer groups for sustainable practice legal liability of farmers w.r.t. chemicals & pollution impacts on people and nature <p>Workshop: Needs Analysis:</p> <ul style="list-style-type: none"> environmental legislation related to agricultural practice agribusiness, marketing and environmental standards drivers license required by extension staff 	<p>AG-CQ17</p> <p>AG-CQ18</p> <p>AG-NA2</p> <p>AG-NA4</p> <p>AG-NA5</p>
Environmental Ethics/ethical orientation	<p>Workshop: Critical Questions:</p> <ul style="list-style-type: none"> ethics – treatment of animals, healthy food, impact on nature, treatment of employees, concern to understand the issues and ethics understanding of ethics w.r.t. people and nature balance interests of individuals with interests of community role and responsibility of people towards each other and nature responsibility of farmers of impacts of products on people and nature what needed for farmers to become more responsible towards nature and people global and local principles to guide ethical decision making how education helps address environmental and ethical issues <p>Workshop: Needs Analysis</p> <ul style="list-style-type: none"> workplace ethics limits of acceptable change <p>Document analysis of educational material:</p> <ul style="list-style-type: none"> cutworms are reduced by keeping lands weed-free before planting, if necessary apply cutworm bait directly after planting or spray a registered insecticide over the row herbicides applied incorrectly will damage the maize & waste money sprayed weeds will die in 2 weeks, if some still green spray again 	<p>AG-CQ12</p> <p>AG-CQ14</p> <p>AG-CQ10</p> <p>AG-CQ11</p> <p>AG-CQ13</p> <p>AG-CQ15</p> <p>AG-CQ22</p> <p>AG-CQ25</p> <p>AG-NA5</p> <p>AG-NA8</p> <p>AG-DA7</p> <p>AG-DA8</p> <p>AG-DA10</p>