An investigation into knowledge and change in a Grade 9 environmental research project

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Abstract

This study considers a Grade 9 Integrated Environmental Research Project which was implemented as a vehicle to induce knowledge-based change in learners. It was noted that change did not occur as hoped, and this study was undertaken to review the Grade 9 Project in order to improve it and to probe the apparent gap between knowledge and action.

The study generated evidence on the learning processes within the project. This revealed a number of contradictions and tensions which limit change initiatives within the local environment. Notable here was a contradictory mandate between undertaking a research-based change project and responding to the rubric of assessment which was not linked to the research done. It was found that faced with this dual mandate, learners chose to focus on the assessment-laden mandate as this was the ultimate agenda that would reap the reward within the traditional school environment.

The study examines the gap between knowledge and practice to probe ways in which to close this gap in the context of an environmental research assignment. The outcome is a recommendation that we as the project designers review the evidence of tensions and contradictions revealed in the study to reflect on the underlying purpose of the project and reshape it in light of recent literature on the challenges of social learning and change.

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Chapter 1: Introduction and Background to the Research

1.1 Introduction

This chapter serves as an introduction to the context within which my research is taking place, a synthesis of the case I am researching, and a brief overview of the intentions of the study.

To start with I have given an overview of the school system within which I find myself, as it is not the 'run of the mill' single school, but rather a more complicated model of integrating two separate, single sex schools. This is important to contextualize as it opens up the platform for the potential communication issues that could occur when trying to constitute any work across a grade between two schools.

Secondly I provide an overview of the project that I am researching – an integrated environmental research project with different topics for individual classes.

Finally I look at what it is I want to investigate specifically about this project, and to what ends.

1.2 The School Environment

There is no simple way to contextualize the school environment in which I teach. I am employed by a private girls' high school that works in close co-operation with the private boys' school next door. The teachers in the schools have a generally positive relationship, and across the two schools each individual Learning Area (LA) is run as a single unit (Department), although the administrative duties remain separate within each school. The schools attempt to keep the Grade 8 and 9 classes single-sex, and girls with teachers employed by the girls' school and the boys with teachers employed by the boys' school. However, due to timetable and teacher constraints this is not always possible.

The teachers within individual LAs generally meet once for a school period (approximately 42 minutes) in a seven day cycle for discussion, once a week there is a joint tea for the two staff, and once a week there is a joint meeting where some form of presentation is given or discussion held for the academic staff across the two schools. Apart from that there is little time for the two staff to correspond verbally, and much communication is done via email. It is not difficult to imagine that this can sometimes lead to

communication breakdowns within Departments due to the large physical distances between staff and the limited amount of 'contact' time that staff may have with each other.

To add further to the complication, the LAs of Geography and History are taught independently of each other at Grade 8 and 9 levels, yet there is a close synergy between the two Departments due to the recognition of 'Social Sciences' at this level at school.

1.3 The Development of the Grade 9 Integrated Environmental Research Project

The Grade 9 Integrated Environmental Research Project (G9IERP) has grown out of the Social Sciences research that formed part of the requirements of the Grade 9 Common Tasks for Assessment.

For the first few years I taught at the school, the Grade 9 project took the form of a limited project focused on the local school environment. This project was originally undertaken by the History and Geography Departments (i.e. Social Sciences) only, and had a limited focus – one year it was focused more on History, the following year more on Geography.

The potential for this project to be much more was recognized by the Social Science teachers at the schools as the recognition of the common skills between Learning Areas began to emerge through an initiative to review these at a Grade 8 level. One of the emergent commonalities was that of research skills that were required across many of the LAs.

In 2007, the Community Engagement Officer affiliated to the schools saw the potential for this project to have a more community-based aspect to it and, together with one of the Geography teachers, evolved the project into a research project in the broader community, no longer confined to the Social Sciences Learning Area, but including other Learning Areas too.

The potential communication breakdowns that exist within Departments due to their bi-campus distribution are minor compared to the potential ambivalence that could occur over the two campuses across multiple LAs. To overcome this, the teachers involved met bi-weekly over lunch, and the project was predominantly organized and driven by the Social Science teachers who were able to meet a little more frequently.

The project developed into an investigation into local communities, where each class within the Grade was given a specific area to study. The class was divided into groups by the supervising teacher, and

visited their allocated area; each group was required to come up with a focus within the area that they wished to study and to work as smaller groups on their chosen topic. The undercutting theme throughout the project was a local catchment study, and one of the overarching goals was to feed back information to a civic forum within the city that was looking to improve the health of the catchment.

As the project was run under the Geography and History teachers' guidance, it fell within their lesson time. Co-ordinating this ambitious venture was thus no small task – five individual Grade 9 classes of approximately 30 learners each were involved: each class with different lesson times; each with a different area within the community and different research topics; and different teachers in charge of each class, requiring a multitude of equipment from various LAs to ensure that the project could function smoothly. Considering the logistics of organizing busses to transport the learners, the teachers and the equipment to the various sites at least three times each over the course of approximately two weeks, it is incredible that it ran as smoothly as it did.

The problems that were identified included practical issues such as the failure to get the correct water quality-measuring equipment to the learners who had chosen to research water quality and the failure to fully instruct the learners on how to use this equipment; the busses taking multiple trips resulting in some learners being late for their next classes; and so on. Some of the social issues that were identified included a lack of interest by some members in the topic that was chosen by the group, which resulted in some half-hearted efforts, and other social issues that typically arise in Grade 9 learners working in groups.

Many of the teachers felt that the project was wasted time due to these practical drawbacks and felt that the learners had not learned as much as they would have in the classroom. A number of groups of learners felt, however, that the project was a worthwhile experience and they were keen to take their project findings to the next level – trying to find solutions to the issues that they had unearthed.

The research findings were never published or made known to the group involved in the catchment clean-up as time had not been allocated for this to happen. On return to the classroom, teachers and learners continued with the routine teaching that occurs on a normal school day. Many of the learners expressed an interest in finding solutions to the problems they had studied, but little opportunity was available for this to happen.

In 2008, no major research project was undertaken at Grade 9 level. There were a number of reasons for this, including a change in staff within the Geography and History Departments, as well as a shifting of the Community Engagement Officer's position from both schools to only one school.

In 2009 the Grade 9 project was resuscitated, and the co-ordinators proceeded to revamp and reorganize this project into a more official integrated project which could offer practical ways to 'green' the school and the local community. With support from the schools' management team, and armed with prior experience and a breakdown of some of the problems that had been noted in 2007, three entire days of school were set aside for Grade 9 research each Wednesday morning for three consecutive weeks. During the planning stages of this project, there was a call for each Department to forward their LAs' environmental component from the curriculum statements at Grade 9 level to the project co-ordinator, who with a team of interested staff, created a revised integrated environmental research project for Grade 9.

The 2009 Grade 9 Integrated Environmental Research Project (G9IERP) was based on an identified common theme of research across the various LAs, resulting in an environmentally focused research project. The idea was that the learners would cover a variety of requirements from the various LAs, or make use of the skills identified by each LA, within this research project. They would come up with some practical recommendations to counter the issues that they had researched by the end of the three weeks, which they would then implement. At the end of the project, a general feedback session would be held where the best projects would be presented to the grade, thereby ensuring that each learner had been informed on every topic and that the curriculum requirements for the environment would be covered.

Using the information that had been fed in from the various LAs, five general topics were decided upon. These were: power and water usage in the boarding houses; paper usage at school; drinking water sources; the town's water quality; and recycling plastic bags. Each class of Grade 9s was given a general topic (the girls' classes were allocated the projects on paper and plastic), from which individuals were required to identify an area of research that they would be interested in undertaking. Each learner presented their idea to the class, and from these the class was divided into groups based on these interests.

At the beginning of the process, the teacher in charge of each class spent time providing an overview of the research process. This overview was based on a set of principles that were sent to each teacher

prior to their lesson (Appendix A). The learners were then given a number of handouts to which they could refer – one on the research process (Appendix B) and the associated rubric (Appendix C), a guideline on what information should be presented for assessment (Appendix D), a rubric for the assessment of the reflection that had to be written in both English and the learners' First Additional Language (Appendix E), and the appropriate Life Orientation poster and solution implementation project (Appendix F). From this they embarked on the three day research project spread over three weeks. During the three days of research, teachers from various LAs that were involved were given set times to visit each class to offer advice and to oversee their section of the project. Learners were provided with a timetable of when each teacher would be available for consultation, and were also advised that they could approach the various teachers outside of this time if necessary. Learners were given *carte blanche* with their time, and were expected to use their three days as they saw fit to meet the requirements and deadlines of the project. Ultimately every group handed in their project timeously and the general feedback was positive from all parties concerned.

The schools see this project as one that will continue to evolve and develop and feedback to improve the project is welcomed.

1.4 The Goals of My Research

As someone who is interested in improving the local environmental conditions, recently put in charge of the environmental portfolio at the school, and one of the facilitating teachers of the project, I felt that not much had changed in terms of general practices regarding paper usage and disposal (one of the focus areas that looked specifically at the school's practices in this regard) around the girls' school on completion of the project. I did not expect to see a change regarding plastic packet usage as this project was focused in the broader community of the town; nor did I anticipate witnessing changes regarding electricity and water usage specifically, as these projects were the focus of the boys' classes at the brother school.

In light of the call for feedback to improve upon the project and my general observations regarding a distinct lack of change regarding paper usage, I focused my research on the 2009 implementation of the project at the girls' school with a view to better understand the process that was embarked upon by the learners; to gain a deeper insight into what they have learned. With a view to improving this aspect of the project I wished to see if by undertaking the research, the learners have made informed, knowledge-based changes to their beliefs, values and sustainability practices.

Thus the research revolves around the key question: can engaging learners in research of a local environmental issue lead to knowledge-induced sustainability change? Stated differently, the aim of my research is to see how the G9IERP allowed learners to access knowledge regarding their key area of interest, and whether, through accessing this knowledge they changed to sustainable practices.

To this end I have identified four key research questions:

1. How was it anticipated by the teachers that the content of the project was accessed by the learners?
2. How did learners access or create knowledge via this project?
3. Is there any evidence of continued knowledge-induced change stemming from the G9IERP?
4. What measures could be taken to help improve the project in respect of the above?

In the bigger picture, I hope to identify where the strengths and weaknesses lie in the G9IERP as it was implemented in 2009 so that areas where improvements can be made in the design and implementation of this type of project in the future can be identified.

1.5 Overview of the Study

The six chapters in this thesis are designed to address the research in the following way:

Chapter 1 gives an orientation to the study. Here the school environment is contextualized, and an overview on the development of the G9IERP is given. The aims of the project are outlined, and the ultimate goal of understanding knowledge-based change and improving the design of the project are identified.

Chapter 2 provides a literature review which provides a framework of the development of environmental education in South Africa within which the G9IERP was created and implemented. This framework provides a background against which the complexities of the G9IERP can be explored. Ideas concerning social learning are presented as a second framework against which to explore the complexities of learning in the G9IERP, as learning with a view to change is a key element to this research, and social learning appears to offer a way in which change can occur based on individuals deconstructing their knowledge and communally reconstructing it in order to promote the potential for

change to occur. Due to the suspicion that there was a gap between knowledge and practice, I explore this gap as it has been identified in some of the environmentally-based literature.

Chapter 3 presents the method and methodology that underlies the project, and justifies the decisions that were made regarding the accessing of data and the presentation thereof.

Chapter 4 presents the data that was accessed in light of the intentions of the teachers with regard to learners accessing content, the learners' experiences of accessing knowledge, the evidence of the knowledge that was accessed, and the statements of intention to change based on the knowledge accessed by the learners. The final section of Chapter 4 considers the changes in practice that are still in place a year after completion of the project.

Chapter 5 is an analysis and discussion of this data in light of the literature review. It was found that social learning was not sufficient to explore the complexities that presented themselves within the data regarding the environmental issue, and showed a distinct gap between knowledge and practice had developed. An overview of the key contradictions and tensions is provided at the end of the chapter.

Chapter 6 is the concluding chapter in which the evidence is summarized and recommendations for improvement are presented. There is also a reflexive review of the study, offerings of improvements that could have been made, as well as recommendations of further research that could be undertaken.

Chapter 2 – A Review of Social Learning, Knowledge and Change in an Environmental Education Context

2.1 Introduction and Overview

The following literature review is intended to frame the research that I embarked upon – an investigation into the knowledge component of an integrated, problem-based, real-world, localized research project in an environmental context in a South African school in order to identify any change that occurred.

The review looks at environmental education (EE) in a South African context, providing a context within which the Grade 9 Integrated Environmental Research Project (G9IERP) was developed. Literature on problem-based and integrated research as a means to creating localized knowledge that learners can relate to is considered, following which the importance of knowledge-based change is explored, along with the gap between knowledge and change that has been identified by a number of authors, including Stevenson and Orr. Finally, social learning (the ideas of Sen and Wals) as a means to generating potential for change is considered. At the end of each section of the literature review, I consider the relevance of the review in light of the research project.

2.2 Environment in South Africa Education

2.2.1 The Environment, Sustainable Development and Education for Sustainable Development

From authors such as Rachel Carson (1962), a clear picture of a declining environment damaged at the hands of humankind is painted. In the United Nations Conference on the Human Environment held in Stockholm in 1972, the first international discussions between rich and poor nations regarding the environment were held. This led to the Stockholm Declaration (1972) in which there is a strong argument that ignorance and indifference results in the potential for humans to do irreparable damage to the environment on which humanity depends for survival, and that through 'fuller knowledge and wiser action' it is possible that the environment could be maintained and improved in such a manner as to sustain prosperous human life.

Beck's (1992) arguments around risk society note that solutions to one environmental (or other type of) problem could ultimately end up causing a myriad of further problems. As Lotz (1999) notes, education has been identified as a key response to help reduce these problems and minimize the risk associated with them, and identifies the need to "build capacity to respond to environmental crises in diverse situations and in different places…" (p. 49). While in this case, she is referring to adult education, the premise holds true for the younger generation, as they are just embarking on their process of life-long learning.

Continuing from the conference in Stockholm, there has been a myriad of activity in the EE field, including the Tbilisi Principles in 1977 which outlined effective guiding principles for EE in which an interdisciplinary approach to learning about the environment in its totality was stressed.

Irwin and Lotz-Sisitka (2004) outline South Africa's move from education about the environment (what was known as 'conservation education') in the 1970's into a more hands-on outdoor education in the 1980's, through to a cautious acceptance and implementation of the Tblisi principles in 1989 and the development of EE courses at a few tertiary institutions in South Africa.

From this it can be recognized that South Africa follows international trends, albeit belatedly. A formal step was tabled in the Government White Paper on Education and Training (1995):

> "Environmental education, involving an inter-disciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources" (Principle 20, Chapter 4, unpaged).

Thus it was declared that EE would become an integral part of education at all levels of the education system. With the development of Curriculum 2005 in 1997, EE was defined originally as a cross-curricular phase organizer, but in the revised National Curriculum Statement (NCS) in 2002, these phase organizers were done away with, and 'environment' became integral to all the Learning Areas (LAs), not only at school level, but at the Further Education and Training level too.

In 1987, the Brundtland report identified the need for sustainable development, and in 2002, the United Nations General Assembly adopted the idea of a Decade of Education for Sustainable Development.

South Africa, typically trailing behind the international policies, currently remains with environment as part of its curriculum, with a strong thread of sustainability running through it.

The ideas of 'Sustainable Development' and the 'Education for Sustainable Development' have been critically discussed in much of the literature. Jickling (1992) and others such as Scott and Gough (2003) argue that the term 'Sustainable Development' has not yet been definitively defined, nor indeed found to be the answer to the world's environmental problems, and that there is much debate about the validity of Sustainable Development as a practice. Gruenewald and Manteaw (2007) remark that the lack of clarity of this term is in itself detrimental to the overall education process – the example they explore is that policymakers may interpret this as development in an economic sphere only. Some authors go as far as to suggest that the term is, in itself, an oxymoron. Thus there is a strong movement suggesting that it is therefore impossible to educate for sustainable development, since the meaning of the term is still in contention.

Jickling stresses in many of his papers (Jickling (1992, 2001 and 2003), Jickling and Wals (2008)) that he is, without doubt, against educating someone 'for' something, arguing that with such an agenda one is narrowing down options in learning by not allowing learners to develop the ability to critically think about various alternatives that may have as much, if not more value; a sentiment that Wals and Heymann (2004) concur with. Gruenewald and Manteaw (2007) recognize, however, that there is an urgent need to shift education away from a form of individual competitiveness to one of sustainable inclusiveness – which, as has already been pointed out is a thread within the South African curriculum.

Reflection in light of my research

The research I undertook was on an environmentally-based project which had its roots in this sustainability endowed curriculum within South Africa. The project required learners to look at an environmentally related issue and examine why their research could be important – there was an expectation that learners would explore the unsustainable nature of current practices within in their selected fields of study. The project that the learners embarked upon appeared to epitomize Principle 20 in the Government White Paper on Education and Training (1995) – it was "an inter-disciplinary, integrated and active approach to learning", designed to "create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources". This idea is further examined in Chapter 5.

2.2.2 The National Curriculum Statements and Outcomes-Based Education

Orr (2004) suggests that one of the problems within today's education is that citizenship and responsibilities are not being taught, however there seems to be a focus on the individual's rights. He identifies this as potentially being one of the underlying causes of the reluctance to change environmental practices. Orr argues that until the level of dependence we place on the services of nature is widely recognized, and that to be selfish with the earth's resources is "unpatriotic and wrong" (p. 32), the ecological emergency (as he terms it) cannot be resolved.

The National Curriculum Statement's (NCS) general guideline has as one of its underlying principles 'Social Justice, a Healthy Environment, Human Rights and Inclusivity" (Department of Education, nd, p. 10). Each Learning Area (LA) has Learning Outcomes (LOs) and Assessment Standards (ASs) which are, in theory, guided by this principle, from the lowest grade through to the highest FET qualification. As Peden (2006) notes, this makes EE the responsibility of every teacher.

Lotz-Sisitka, Gumede, Olvitt and Pesanayi (2006) offer an insight into 600 interviews of environment and sustainability education practitioners throughout southern Africa. Their report concludes that there is a limited understanding of the concept of sustainable development and issues associated with it in southern Africa. They note that generally,

> "… educational practitioners in southern Africa are not engaging adequately with the contextual fabric of their societies and environments, with contemporary development trends and policies, and with issues that threaten the future of southern Africa" (p. 63).

The report calls for "ways in which education can contribute to poverty alleviation, social equity, ecological sustainability and social justice and human well being" (p. 63).

According to Reddy (in le Grange, 2004), "environmental learning" (as opposed to 'environmental education') was selected as a language to distance the new OBE system from the teacher-dominated pedagogies of the previous apartheid government, and can be seen to shift the emphasis from teaching to learning, which he argues could result in a simple accessing of information, rather than a processing of this information. Le Grange (2004) argues that the language of learning (as opposed to that of education) puts a different slant on the interpretation of the documentation associated with the curriculum, and while it is generally accepted that 'environment' is in the curriculum and the OBE policy

documents contain all the necessary outlines for environmental learning to happen in the classroom, he concludes that, based on semantics, one could suggest that environment is not in the curriculum, but rather that there are only "the spaces for enabling [the] environmental education process" (p. 139). It is therefore up to the teacher to ensure that this environmental education space is made use of.

It has been said that OBE was introduced within South Africa due to the departure from apartheid requiring a whole new education system (Mason, 1999). The movement away from teacher-dominated scenarios into learner-led experiences with teachers as facilitators was seen as a radical shift from the failed, predominantly rote learning experience that many South Africans had been faced with during their oppression. However, critics such as Jansen (1998) note that amongst other shortcomings, OBE 'trivialises' curriculum content, and that "by organizing knowledge around discrete competences, OBE overlooks the important cross-curricular and inter-disciplinary demands encountered in learning a complex task" (unpaged – eighth criticism). Mason (1999), referring to curriculum content as propositional knowledge, notes that this propositional knowledge, procedural knowledge (knowing how to do something), and dispositional knowledge ("the knowledge associated with attitudes, values, or moral disposition" p. 142) are all interlinked, and argues that critics of OBE, such as Jansen, are perhaps missing the fact that there is a more equal distribution of these three kinds of knowledge in OBE, and the emphasis has shifted away from the heavily weighted propositional knowledge under the apartheid education system. He argues that to remove propositional knowledge from OBE would undermine the potential strengths of OBE (p. 142), and that good teaching practice in any event ensures that all three knowledges – propositional, procedural and dispositional – are incorporated in the classroom.

The specific inclusion of environmental learning into the curriculum has been viewed as a positive step as it allows opportunity for the environmental learning to happen in the classroom, but as le Grange (2002) points out, it neither guarantees that this learning will happen, nor does it ensure that the environment with all its complexities will be addressed in the classroom.

In his viewpoint, le Grange (2004) continually cautions against teachers simply applying the curriculum statements as they stand. Apart from not being specifically inclusive of EE, he urges that it is critical that teachers recognize that environmental issues are far more complex and broader than the aspects expressed within the curriculum statements. It is his opinion that environmental knowledge is generated via "interdependent and interactive relationships between teacher and learners who engage critically with information, issues and problems, often resulting in unintended outcomes" (p. 139). He

hints at a potential problem with a lack of environmental knowledge within the teaching profession, a problem which is re-iterated by numerous authors (for example Loubser, Swanepoel and Chacko (2001), le Roux and Maila (2004), and Zietsman and Pretorius (2006)).

As noted earlier, the NCS FET general guideline has as one of its underlying principles "Social Justice, a Healthy Environment, Human Rights and Inclusivity" (Department of Education, 2002, p. 10), and the GET principle governing environmental learning is similar: "The relationship between human rights, a healthy environment and social justice is addressed in each Learning Area Statement". These statements are there to guide environmental learning in the NCS. Lotz-Sisitka and Schudel (2007) acknowledge that the emphasis on human rights in the NCS is politically motivated in response to the apartheid policies that denied many citizens of the country access to its resources; it is therefore steeped in the democratic identity of the country. They note that the right to a healthy environment is considered a basic human right according to the country's constitution, and that the NCS seeks to embody the values of sustainable and equitable resource use and management to this end.

Reflection in light of my research

The project that was undertaken by the learners was specifically designed to incorporate aspects of the environmental component of the curriculum that could be overlooked by teachers. It had the intention through engaging with the complexities of an environmental issue to develop in learners an appreciation of human rights in relation to the environment and generating and implementing a plan of action to improve upon the actions of the local communities to ensure that this right was met, hence creating a space for the development of citizenship. By its integrated nature, the project intended to incorporate both propositional knowledge (facts), procedural knowledge (skills), and to aid in developing dispositional knowledge (values and moral codes).

2.3 Problem-Based and Integrated Research Projects as a Means of Creating Skills and Developing Change

Lotz (1999) explores the complexities of the environment and suggests that by entering into dialogue over everyday environmental issues and risks within an action-taking context, it is possible to equip learners with skills, attitudes and locally relevant knowledge to help address these issues as they arise, and as they change over the course of time.

O'Donoghue and Janse van Rensburg agree with this, suggesting that while the environment is shaped by social, political and economic forces, teachers tend to teach about, around and for the environment in these isolated, compartmentalized blocks, rather than as an interrelated unit (in Peden, 2006). Orr (2004) stresses the importance of producing learners who are capable of piecing the parts that are temporarily created for convenient teaching back into the whole.

Le Grange (2004) remarks on how it is becoming increasingly necessary for general members of the public to rely on the knowledge of experts in various fields to aid in decision making to help reduce these environmental risks faced in life. If one considers O'Donoghue and Janse van Rensburg's (in Peden, 2006) proposed model of active learning, one realizes that in order to resolve a real world issue it is necessary to draw on a variety of specific knowledge bases – political, social, biophysical and economic – as it is impossible to make a decision with only one field of knowledge.

Zietsman and Pretorius (2006), in exploring issues surrounding the lack of capacity in environmental management within South Africa, suggest that Environmental Managers might need to be people who are more generalist in their education, able to link across different disciplines, rather than the more disciplined-refined and –focused type of graduate that many tertiary institutions in South Africa are currently producing. This suggests that in dealing with EE, it would be useful for learners to be able to see the links across subject areas, rather than compartmentalize their knowledge, and that there is a need to develop an integrated approach to problem solving in the youth of today.

Pace (2003) explores how younger students are more accustomed to learning interdisciplinary approaches, rather than 'monodisciplinary'. He notes that Geography has been identified as a subject which can lend itself to teaching in a cross-curricular fashion. His research into primary school teaching of Geography in Northern Ireland revealed that despite the curriculum being subject based, roughly 70% of all teachers interviewed taught Geography with a medium to high degree of cross-curricularity. Pace acknowledges James Beane's (1991) view that "true curriculum integration occurs only when young people confront personally meaningful questions and engage in experiences related to those questions" (p. 381).

Beane (1991) suggests that LAs themselves are abstract categories, and that real life is not dissected into compartmentalized blocks by subject. When faced with a real life problem or puzzle, one intuitively pulls knowledge and skills from wherever may be appropriate in order to find a solution. He suggests that LAs are potentially obstacles to meaningful education. Furthermore he cautions against confusing

multidisciplinary with interdisciplinary – typically a multidisciplinary project would be one in which each learning area could identify the part which falls under its umbrella, so to speak.

In considering problem based learning – where teachers use problem-solving strategies as a starting point for learning – Beringer (2007, p. 446) emphasizes the importance of creating an 'extensive and flexible knowledge base' on which to build the higher order thinking skills that are required for problem solving. In his study, Beringer notes that removing both the teacher and learner from their usual methodological comfort zone is difficult, and requires new skills to be learned on both the part of the teacher and learner.

Pace (2003) concurs with both Lotz (1999) and O'Donoghue and Janse van Rensburg (in Peden, 2006), in that he identifies the need for learners to be equipped with the skills and abilities to be able to adapt to new scenarios, and the ability to view environmental issues as fluid – as contemporary society changes, so too does the environment.

Beane (1991) suggests that a truly integrated activity would be one in which the teachers relinquish not only their specialized content in their LA, but also their role as instructor; this should be replaced with an activity in which the learners identify the current issues that are of concern to themselves (rather than deal with a topic which the teacher has supposed would be of concern to them), and the teachers become guides and facilitators to the chosen issue. One of the advantages of this is that the learners have a voice in deciding what they should be studying, which places them at the advantage of being interested in what they are learning about; the method of learning becomes constructivist in nature – the learners work from their own knowledge and via questioning and research, are able to find answers and solutions to the issue that was of concern to them in the first place, thus finding stimulating their interest in their studies; and while not all students might learn the same content knowledge, the skills that are developed to gain access to this knowledge are integral to being able to cope in an era of exponential growth in knowledge resources. Beane argues that such a project would be 'person-centered, constructivist and thematic', and provide meaningful education, and widely different from a learning area, content driven learning experience.

Reflection in light of my research

The project that was undertaken was designed to be integrated (as opposed to cross-curricular) removing learners and teachers from their comfort zone of designated LAs. In Chapter 5 I look for evidence that learners are equipped with enough skills or access to obtain and/or develop these skills in order for them to partake in their investigation effectively, and explore whether the learners are able to generate solutions to the problems that they have investigated.

2.4 The Importance of Knowledge for Change

Stevenson (2007a) provides an outline of some of the discrepancies that occur between what today's environmental education is calling for, and what the curriculum provides for. The interdisciplinary nature of EE has been noted by many authors, as shown earlier in this chapter, however Stevenson suggests the curriculum provides compartmentalized LAs, and that the emergent and issues-based nature of EE is countered by the predefined school curricula. He suggests the uncertain nature of proposed solutions to environmental issues is countered by the structured outcomes proposed by curricula; knowledge in EE requires immediate action, knowledge in a school curriculum is intended for storage and future use. These two extremes are problematic for the teacher to design a curriculum-based environmental change project.

Referring back to Mason's (1999) ideas about curriculum content as propositional knowledge, procedural knowledge and dispositional knowledge in light of Stevenson's suggestions, it becomes apparent that the implementation (as opposed to the development) of procedural knowledge outside of the curriculum in light of propositional knowledge and dispositional knowledge is not necessarily catered for by the OBE curriculum, despite having as one of its main intentions that of developing skills. Stevenson (2007a) notes that the recommended learning styles in EE call for active participation and knowledge generation by the learners (a call confirmed by the White Paper on Education discussed in Section 2 of this literature review) but he contends that the standard teaching practices across many schools remain teacher focused with passive learners; instead, the call for real life scenarios being studied is countered by the theoretical application of skills and knowledge in artificial scenarios.

González-Gaudiano (2007) comments that in Latin America a similar situation has been identified – the conventional school curriculum has increasingly exhibited an inability to produce citizens able to respond to the complex challenges of the real world – pointing to a contradiction between knowledge

and action. Orr (2004) sums this up in his contention that the body of knowledge in the world and about the world is growing at a phenomenal rate and the assumption that humankind's goodness is growing with it is a misnomer.

Allais (2007) notes ironically that while one could argue that OBE counters the standard curricula being referred to here and is far more aligned with the EE intentions, there is often an over-specification of the outcome statements which ignore the issue of knowledge altogether. She also notes that out of necessity, curriculum knowledge, no matter what kind of curriculum, "must be discontinuous with everyday experience", and that a curriculum which only focuses on "everyday experience cannot enable learners to move beyond that experience to understand it in a broader perspective." In other words, if one only focuses on the actual skills that are specified in an outcomes based curriculum one cannot expect to expand the learners' horizons; one needs to move learners into new and unknown territories of knowledge in order to enhance their understanding.

Short (2010), in turn, notes that without sound, well researched causal effects underlying environmental issues, there can be no responsible action taken and no improvement in the quality of the environment can be expected, so one needs to be cautious that one does not teach content and knowledge without equipping learners to be able to deal effectively with that knowledge. Orr (2004) cautions against allowing children to choose a career before finding a calling – emphasizing that access to and understanding of knowledge of the world/environment can lead to intellectual decisions being made steeped in greed and economics only if the learner is not also equipped with the ability to choose the human intelligent (right/ethically sound) way to use that knowledge. The discrepancy between what learners learn about the environment and their perceived inability to change the world around them can lead to this intellectual, rather than human-orientated decision making dominating.

Stevenson (2007a and 2007b) stresses that in order for learners to understand an environmental issue in enough depth to allow them to develop the capacity to act (and thereby close the participation gap identified by Gruenewald and Manteaw (2007)), they must take cognizance of the expanding scope of the issue, including the political, social and economic concerns so that they are able to develop a moral code; he notes that the knowledge component is easily incorporated into the structure of schooling by its very nature (a statement that Orr (2004) concurs with), but it is far more challenging to incorporate the action orientated environmental education aspect into a structured school curriculum.

Gruenewald and Manteaw (2007), in looking at ways to reduce the 'participation gap' (p. 181) suggest that solutions involving democratic participation may be useful – while their suggestion relates to the language of environmental education (rather than to proposed solutions developed by learners), they note that a strategy that appeals to a much broader constituency has the potential to reduce the 'participation gap' that they have identified.

Reflection in light of my research

The participation gap highlighted by Stevenson, and Grunewald and Manteaw is a key area of focus for this research. It is apparent from these authors, as well as Allais, that a balancing of skills and knowledge, known and unknown needs to be carefully planned if one is to successfully close the gap between knowledge and action. I would like to see if the G9IERP, which looks at incorporating propositional, procedural and dispositional knowledge with a view to create practical, more sustainable solutions and thereby possibly change, actually manages to close this participation gap – i.e. has it been possible, through use of integrated, localized research to not only allow learners to access knowledge through which they can recognize the need for a change in practices, but also allow them to present solutions to real life problems that have been identified and follow through on these with action in the longer term?

In order to do this, I will look for evidence in the G9IERP experiences that indicate that knowledge has been critically reflected upon and sustainable change has occurred.

2.5 Social Learning and Change

Wals and Heymann (2004) see the exploration of sustainability as a concept to be extremely rich as a learning experience – the possible conflicts that may arise and be identified can be used by a skilled educator to provide spaces within which social learning can occur, and discussions around various points of views allowing for new meaning making to develop and own decision making to occur is the only legitimate goal of sustainable living in their opinion. Stevenson (2007a) notes that an inquiry process in which the intended outcomes include taking action on real environmental issues requires that learners develop "knowledge, skills and values that are not only directed towards action, but emerge in the context of preparing for (i.e. the inquiry) and taking action" (p. 146) – in other words, the action that is proposed needs to be emergent from the local context in which the research took place. Linked to this,

Gruenewald and Manteaw (2007) suggest that solutions that have the potential to be successfully implemented should involve democratic participation.

Olate (2003) notes that when considering Amartya Sen's capabilities perspective, one must caution against hidden agendas – Sen purposefully left his capability approach as being underspecified in nature. Wals and Heyman (2004) note that the idea of "sustainability provides an opportunity for the joint contextualization and exploration of meaning" (p. 21), and that it would be wrong for a powerful entity, such as a government or knowledge-expert to dictate to citizens how to behave, as each unique situation could have its unique set of solutions, and no one way or 'right' sustainable lifestyle which can be deemed to be appropriate for all players. However, Wals and Heymann (2004) specifically note that the knowledge held by these technical experts can be important to the ultimate decisions that are made.

Sen is attributed to note that the selection of capabilities to be developed or changed should be done "by means of a democratic social choice procedure and public deliberation" (in Olate, 2003, p. 7). Olate points out that Sen stresses the importance of people's inputs and group decision making in order to make an ethically justified choice. This links back to Orr's (2004) call for a broader recognition of the rights of communities rather than of individuals. In order for this to occur, Wals (2007) and Wals and Heyman (2004) suggest that first one needs to frame/contextualise one's own understanding of the issues at hand, and then to deframe or deconstruct them in conjunction with other people's understandings of the issues at hand, to co-create them once more, inspired by others' views, knowledge and opinions. From this viewpoint, one is then able to translate one's understandings into "collaborative actions" (Wals, 2007, p. 41), to create sustainable solutions in a democratic manner (Sen in Olate, 2003).

Without relevant knowledge, however, socio-ecological issues cannot be addressed at all as Lotz (1999) points out. Wals and Heymann (2004) suggest that in considering environmental issues in a social learning framework, knowledge forms a critical part in terms of framing one's understanding of the issue being considered. They note that in the deconstruction of one's own understanding in order to reconstruct a fuller, joint understanding through merging this with others' view points, individuals "construct their own frames based on often fixed meanings which are of a cognitive (i.e. knowledge), affective (i.e. emotions) and social (i.e. relational) nature" (p. 15). Thus they recognize that

sustainability education within a social learning framework allows learners the "opportunity to confront their core values, their practices and their entrenched lifestyles" (p. 23).

Wals and Heymann (2004) conclude their paper with a thought that educating for sustainable living is, in itself, a social learning practice. Such practices, by their nature, provide spaces for, amongst other things "new ways of thinking, valuing and doing" and 'autonomous and deviant thinking" (p. 23). Ewert and Galloway (2009) suggest that a possible reason for the discrepancies identified by the likes of Stevenson (2007a and 2007b) is steeped in the culture of the school or society – learners are particularly anxious to give what they feel is considered to be "the 'right answer' as opposed to their genuine perceptions and beliefs" (p. 56). Thus a skilled facilitator of a social learning process needs to ensure that this 'agenda' is removed from the agenda if they are to get to the bottom of the knowledge/action gap.

Reflection in light of my research

These authors suggest that sustainable practices can occur when a common value system is generated through a compassionate understanding of the larger community's view points. To this end I will look to the data to see if there is evidence that learners have constructed a new view point based on the larger views held by the community (which they would have gathered through their own data collection) and translated this into sustainable, on-going 'collaborative practices', and if there are hidden agendas that may influence the learners' decision making processes.

2.6 Conclusion

This chapter provides a broader contextual framework of sustainability concepts in the South African OBE system within which the G9IERP was created and conducted. In addition it explores some of the theoretical underpinnings of problem-based learning along with theories on knowledge-induced change and begins to explore problems that have been identified within this arena. In considering the omission of citizenship from curricula in general earlier in the chapter, the section on social learning provides an opportunity to unpack the G9IERP proposed practices developed by the learners in terms of collaborative, sustainable change. Thus this chapter provides a number of different lenses through which the data relating to this research can be considered.

The following chapter considers decisions regarding how the research was undertaken, namely the choice of a case study methodology, the considerations made when collecting data and presenting it, and the ethical issues regarding studies where minors are involved in a school community. Validity and trustworthiness of the data and its presentation are also considered.

Chapter 3 – Research Design Decisions

3.1 Introduction

In this chapter I intend to take the reader through the way in which this research was undertaken. As the purpose of the research was to explore knowledge within the project undertaken by the Grade 9 classes with a view to finding if and how sustainable changes in learner practices ensued, I will reflect on how the vantage point and data generating steps taken in the research to probe and investigate this.

The study looks at an integrated environmental research project that was undertaken by Grade 9s in 2009. The research itself was begun in 2010, and thus relied on historic evidence and recall for its data sources. As a result of this, the research also delves into the historic evidence that is presented in order to address the research question.

3.2 Research Methodology

As noted by Pesanayi (2007), research methodology can be described as "a theory (and analysis) producing knowledge through research" (p. 58). The intended methodology contained throughout Chapter 2 provides the lenses through which the data will be explored.

3.3 Research Design

I have chosen to undertake an investigative case study because the Grade 9 Integrated Environmental Research Project (G9IERP) is a unique project implemented in a particular context, thus lending itself to being studied as an entity.

The G9IERP is, as Stake's (2000) definition of an intrinsic case study suggests, an ordinary case with a particular focus (engagement with environmental knowledge leading to sustainable change). In order to gain insightful depth, I have chosen to view the case study from various perspectives, and to this end gathered data from a variety of sources namely from the teachers who designed and/or implemented the project, from the documentation that was given to the learners to aid in their investigation, from the projects that were produced by the learners, and from the learners (see Section 3.5 for further details).

In examining the data, I have allowed the themes to emerge from the voices contained within each dataset, hence undertaking intrinsic analysis of the data – this is discussed in more detail later in this chapter.

Analytical statements have emerged from the evidence presented in Chapter 4, and these I have considered in Chapter 5 in light of the theories presented in Chapter 2. Conclusions and recommendation have been made in Chapter 6.

3.4 Ethical Considerations

I obtained permission from the Heads of both schools to undertake this research as it involved both staff and learners from the two schools. A copy of the letter sent to the Heads is provided in Appendix G, with the reference to the school purposefully deleted. I have filed these to keep for five years after completion of this project, and to ensure that the anonymity of the schools are maintained.

Each teacher who agreed to an interview was also provided with a similar letter stating my intentions regarding the research. A 'blank' letter is attached in Appendix H. Each teacher signed the associated statement of agreement and these signed documents are also on file.

Giving consideration to ethical issues and the nature of teenagers, it was difficult to decide whether I should approach each learner as an individual or as a group in order to gain their permission to research their individual work. I felt that by approaching them individually, they may see me as an authority figure who should not be displeased in case there is some 'backlash' if they refused my request. I felt that approaching them as a group may result in peer pressure requiring them to all make the same decision. In the end I chose to talk to the learners as a group regarding my proposed research, rather than only presenting them with a letter explaining what my intentions were. Thus, using a spare lesson, I engaged the learners who had participated in the G9IERP in a verbal discussion as to the purposes of my research, and the ethical dilemma with which I was faced. Issues surrounding confidentiality and anonymity were discussed, and learners' questions regarding those were answered. I specifically noted in front of the learners that should they choose to not be involved in the research their choice would be respected, and their work would be left out of the research altogether. Out of 50 learners, only three chose not to allow their work to be researched. Those learners who were prepared to allow their work to be part of the study and to participate in the study signed a similar letter of consent as those of the teachers, and these too are on file.

At the time of talking to the Grade 9s, I had intended to implement a questionnaire. However, as this was before the proposal took shape, the questionnaire that I administered was naïve and I did not refer to it. When implementing the focus group, I asked the learners verbally if I could continue based on the consent form that they had signed the previous year. They were all willing participants in the study. An example of the signed declaration of consent for the learners is attached as Appendix I.

Participants in this study were provided with a clause allowing them to withdraw from the study at any point. The identities of individuals within the schools have been protected to the best of my ability, and issues discussed within the context of this research will not be discussed outside the context of this research.

As the learners are all minors whose parents/guardians subscribe to the school's policies, the Headmistress was offered the opportunity to approve the intended focus group schedule, to listen to the recording of the Focus Group with the learners, and to read the transcripts of the Focus Group, all of which she declined to do. The offer of allowing an observer to be present was also declined.

One of the difficulties I faced was to distance myself from the research to a certain degree as I had been instrumental in implementing this project in 2009. It was important to recognize my involvement and to ensure that I did not impose any preconceived ideas and notions onto this research. To this end I engaged my supervisor in aiding the creation of the questions for the semi-structured interviews with teachers. For the Focus Group I generated a similar set of questions as those for the semi-structured interviews as I wanted to view these aspects of the G9IERP from various viewpoints. During the data analysis stage, careful discussion with my supervisor helped in ensuring that the analysis was true to the data itself. On reflection, however, a careful navigating of my insider perspective balanced by the mediating eye of an independent referent allowed me to probe many aspects of the programme that would have been relatively opaque to an outsider. This aspect of the study that initially worried me thus became one of its strengths, allowing me to take an informed perspective with more refined and nuanced perspectives to open up aspects of the social learning processes that might otherwise have been overlooked.

The transcripts of the interviews and Focus Group were available for member-checking with the key players within the processes, but not all participants chose to take up the opportunity to do so.

All recordings, transcripts and documents are available, and clear references to specific sections of these have been made throughout this thesis allowing the reader to refer directly to the original data if necessary. Apart from the physical work produced by the learners (namely the Learner Projects and Learner Posters), this data can be found in digital format on the disk supplied with this thesis.

3.5 Data Generation Process

As a brief overview to the methods used in undertaking this research, I was familiar with the G9IERP as I was involved in implementing it with a Grade 9 class, thus an orientation to the project was not needed. However, I needed to ensure that I could distance myself from the research so as not to view it through my own experience only. In order to do this I sourced data from teachers and learners and used only this data to draw evidence from so that my own experience was removed from the analysis.

I interviewed members of staff who had been integral in developing the project in order to ascertain what their intentions were, as well as staff who were involved in implementing the project on the days that it ran. I undertook an analysis of the documents that used to scaffold the learners' work – including instructions and rubrics. I ran a focus group with five learners who had done the project, and I undertook a document analysis of four projects that had been completed by the learners. This process allowed issues to emerge and then to be tracked and probed as the process and its outcomes unfolded as education practices shaping the developing arenas of learning engagement.

3.5.1 Semi-Structured Teacher Interviews

I undertook seven individual interviews with relevant staff to generate data on how the teachers approached the project design and implementation.

Here I investigated not only what the intended knowledge or skills content to be covered by the project was, but also how it was anticipated that this knowledge and these skills would be accessed and acquired by the learners (for example: handouts from the teachers, formal lessons on the knowledge, worksheets, self-study by the learners). As Foddy (1993) notes, during this stage of data collection there are potential areas of ethical concern such as issues of lack of professionalism or fear of exposure for not fulfilling the requirements of the curriculum. Thus it is imperative that those being interviewed realized that the purpose of my research was not to explore this, but rather to consider the G9IERP in light of the research goals. One of the reasons why I selected to undertake personal interviews, rather

than work with focus groups at this stage, was that if issues such as those mentioned earlier did arise, the staff member would be assured of anonymity.

There were many staff members involved in the G9IERP, and to interview each and every one of them would have taken too long a time. In selecting seven teachers, I tried to get a range of different LAs that were involved in the process of developing and implementing the project. I interviewed a teacher from each of the following LAs: History, Geography, Natural Science, Physical Science, Design and Technology, Mathematics, and Life Orientation. I did not interview any First Additional Language teachers as there were three potential Languages involved, and to select one would have been to the exclusion of the others.

The teachers who were interviewed worked at either the boys' or the girls' school, as it was not possible to include a wide range of LAs looking at only the girls' school teachers. The fact that there are references made to focus areas other than paper and plastic (which were the focus areas for the girls' classes) adds further insights to the research that was done – it allows for a breadth of data that otherwise would not have been available in the short space of time available for this research. Each interview began with an overview of the intentions of the research and interview, and the teachers were required to sign a consent form, allowing me permission to use the interviews as data, and giving them the opportunity to withdraw from the study at any time. An example of the consent form is attached in Appendix H.

A set of questions was designed in conjunction with my supervisor (see Appendix J), and these were used to guide the interviews. In some interviews not all the questions were applicable, and in other interviews the questions were covered without needing to be asked. There is a definite improvement in interview technique from the first to last interviews, which has led to deeper, richer and more focused data being collected from the later interviewees.

I recorded each of the interviews and transcribed them into a Word document. By recording the interview rather than taking notes I was able to focus on the content of the interview itself, rather than on trying to capture what the teacher was saying. Gillam (2000) notes that it is easier to analyse a fully transcribed text than to try to only transcribe those parts that one hears to be important. He notes that no-one speaks a tightly edited text, and it is far easier to find the substance in an entire text, rather than in a partial copy of the document.

To ensure the anonymity of the interviewees, I labelled the recordings and transcripts using a coding system: TI 1 through 7 (TI standing for 'Teacher Interview'). As there are at least three teachers in each of the LAs, it is likely that the anonymity of these teachers is protected to the best of my ability even within the school environment.

I found transcribing the interviews to be quite difficult as on listening to the recording and reading through the text I had transcribed I found some discrepancies – what I thought I had heard both in the interview and in the recording as opposed to what was actually said. This arose because of my insider perspective and I had to be cautious that I was not reading into the transcript something that was not there. What was an advantage in later probing might prove to be a problem in this case so to counter any imposing bias I asked a friend to double-check the transcripts with the recordings. As my friend is removed from the town altogether, with the coding of the saved files the anonymity of the interviewees was ensured. The interviewees were given the opportunity to check the transcripts as an accurate reflection of their perspective.

Both the recordings and the Word documents are available on the enclosed CD.

3.5.2 Document Gathering

I collected as many different documents that were related to the G9IERP as I could, drawing on colleagues' stores of projects as well as emails that I had received. The data here can be divided into two main types – that which was given to teachers and learners prior to the commencement of the project, and that which the learners produced.

3.5.2.1 Documents Given as Guidelines to Students and Teachers

There were five main documents that were used in the G9IERP and these can be found in Appendices A – F. Appendix A contains the email that was sent to the members of staff that covered the research methods with the learners in class prior to the commencement of the project. I chose to include this document as it shows the scaffolding provided to teachers who may have not known much about the research skills component of the project.

Appendix B contains the research process document as provided to the learners, which gives a more detailed outline of the research process than Appendix A does. Linked to this is Appendix C, the assessment rubric for the research project, showing learners how their final product will be assessed.

Appendix D provides the learners with instructions on how to present this part of their project. Appendix E incorporates the First Additional Language assessment rubric, pertaining to the reflection on the project which the learners were required to write. Appendix F is an amalgamation of the various documents that were given to each Life Orientation class within Grade 9 (each class received only the page that was relevant to them, along with the associated rubric).

These documents provided this research with narrative materials from which to gain insight into the anticipated knowledge and skills that learners were expected to have to approach the activity and to cover and work with in the learning process.

3.5.2.2 Learner Projects

I chose to work with projects from the girls' school only. This was due to the ease of access of these documents, having stored my own classes' projects from the previous year and having access to a colleague on campus who had done the same. Enquiries into accessing the boys' projects met with reluctance on the part of teachers to locate them. The members of the Focus Group were all girls, so it also made sense to look at the projects that were in alignment with the Focus Group insights.

I selected four physical projects to use as sources of data for this research. To ensure a depth of insight, I tried to select projects that were linked to the learners involved in the Focus Group. However, one of these learner's Grade 9 portfolio had been selected for moderation at the end of 2009, so I was unable to refer to her project, and two of the learners in the Focus Group worked together on one project which meant I would only have three projects. In order to ensure that I had two projects from each focus area to add depth to the analysis I randomly selected another project. This gave me sufficient material to work with for depth insight and verification alongside the other sources of data.

I photocopied the projects that I had selected so that I could work on the photocopies rather than the originals. These projects will be stored for five years after completion of this research.

The learner projects provided evidence for the knowledge and skills that were actually covered by the learners within the G9IERP. While there is not an example of each and every focus area (ie there are no examples from the electricity or water usage areas), I felt that it was better to consider two projects from each of the two areas that were contained within the Focus Group so that the data were more aligned with each other and could provide more depth and insight.

3.5.2.3 Posters Promoting Proposed Change

At the beginning of this research, when considering what data sources I could access, I had a discussion with one of the Life Orientation teachers to gauge whether she would be amenable to be interviewed for this research, and whether I could access the work done with regard to change within the Life Orientation section of the project. She informed me that the learners' work regarding the proposed change to practices was stored in the learners' portfolios in Life Orientation classroom, and that I would be welcome to access what I needed as she no longer had use for it.

Towards the end of my data gathering process, armed with her permission and permission from the learners, I looked through the Focus Group members' folders for the evidence of their proposed sustainability practices. On collecting the posters from the learners' files, I was frustrated on two fronts. Firstly I discovered that not all the learners who had been in the Focus Group had filed their posters, so I could not follow through on the same learners. Secondly the majority of posters at a quick glance appeared to only contain material for promoting recycling, pointing to how a culture of expectation shaped this activity contrary to the intention of the task. This was a useful experience that allowed me to probe how an established conventional wisdom played out in shaping the unfolding project as a whole and opened up some of the issues of the culture of schooling that are pointed to, but not made explicit, in some of the literature I was working with (such as Jickling (2003), Orr (2004) and Peden (2006)).

To counter this, I broadened my search to include all the learners who had filed their posters. I chose the posters belonging to the members of the Focus Group where possible as a first choice. Thereafter I selected posters from girls who had been involved in the Learner Projects that were used in this research and that reflected ideas broader than just promoting recycling, or posters which contained more detailed, justifying information on them, so that I could gain a better insight into the thought process behind the proposed changes. In the process of accessing the learners' Life Orientation portfolios I came across a poster which presented a sound argument for recycling, and elected to bring this in to the study as well. The total number of posters that I selected was nine: four posters from each focus area of the project that related to the learner projects selected (i.e. four paper related posters and four plastic packet related posters) and one extra.

3.5.3 Focus Group

I conducted a focus group interview with a group of five learners who had been involved in the project. The group consisted of a mix of learners whose investigative focus had covered both paper and plastic bags. This allowed me to explore to some extent the differences in knowledge acquisition across the grade, yet still maintain a level of comfort for the young people which may not have existed if I had selected a person from each of the focus areas (i.e. both boys and girls).

The learners involved in the Focus Group also signed a letter of consent allowing me to use the Focus Group data in my research, and giving them the opportunity to withdraw from the study at any point in time (Appendix I). In addition to this, as they were minors, the Head of the school gave permission for me to undertake the Focus Group interview with them (Appendix G) and, given the opportunity to look at the proposed questions and to listen to the recording, declined to do either.

The intention of the Focus Group was to look not only at how the learners had felt they had acquired the knowledge pertaining to the project, but also to explore whether any of the sustainable solutions (change) that they had proposed were still in practice a year after the completion of the project.

The questions that I posed to the Focus Group were based on those used in the semi-structured interviews where applicable, and these were used as a guide to ensure that I had covered all the topics I had identified. The Focus Group interview was recorded and saved with the title FG1. I transcribed the recording, leaving out the learners' names and substituting references to learners as "Learner A" or "Learner B" where needed. The transcript does not indicate which learner is speaking as I felt that this would not add value to the data and would aid in ensuring the anonymity of the participants.

3.6 Data Management

I needed to simplify the way of referring to each dataset since there were so many different kinds of data, some of which needed anonymity built in to their names. I therefore coded the data as far as I could.

3.6.1 The Teacher Interviews

The semi-structured teacher interviews I coded with TI (for Teacher Interview), and assigned each a number in the order in which the interviews occurred. As there were seven interviews, the coding

system ran from TI1 – TI7. This coding system was used for both the recorded interview (Memory Stick Voice Files) and the transcripts of these interviews (Microsoft Word Files). For ease of reference to these data within the research, each line in the Word transcripts was assigned a line number. Thus in Chapters 4 and 5 when referring to the interview data, I have provided both the TI number and the line numbers, for example TI4, l3 - l7 would refer to Teacher Interview 4, lines 3 to 7.

3.6.2 Document Handouts

The document handouts I have attached as Appendices, and have referred to them in this research as the relevant Appendix letter. For those Appendices that I have needed to refer to specific areas of these, I have numbered the lines down the left hand side of the documents.

3.6.3 Learner Projects

The four learner projects I have labelled as LP 1 through 4. Each page has a number assigned to it on the top right hand side for ease of reference. Hence a reference to LP1, p. 4 would refer to Learner Project 1, page 4.

3.6.4 The Posters

Each poster has been coded with a P (referring to Poster). If the poster was a paper-related poster, the P is followed by an 'a', and if it referred to plastic packets, it is followed by an 'l'. Each focus area poster is number from 1 upwards, in the case of paper 1 to 5, and in the case of plastic bags 1 to 4. In addition, the posters that were created by learners within the groups that produced the Learner Projects selected for this research, and have been linked directly to the projects through use of the same coding system (LP1 through 4). In addition, if the learner who created the poster was part of the Focus Group, I have noted FG on it as well. Thus a poster referred to as 'Pa4, LP2, FG' it is the fourth poster, is paper-related, created by a learner from the Learner Project 2 group, and this learner was a member of the Focus Group.

3.6.5 Focus Group Data

The Focus Group data was saved as 'Focus Group' under both the recorded and transcribed files. In the transcription, the same technique as for the interview data was used, and line numbers were assigned

to the Word document. For ease of reference, the Focus Group transcript is referred to as FG1, and as in the interview data is followed by a line number.

3.6.6 Summary of Codes

The following table, Table 1, is presented to act as a summary for the abbreviations associated with each data set, and the further refinement of each set to aid in referencing.

Table 1: Table to provide overview of abbreviations used on data

Data Source	Coding	Numbered	Further refinement
Teacher Interviews	TI	1-7	Each interview given a line number
Handouts	Appendix	A-G	
Learner Projects	LP	1-4	Each page given a page number
Paper-related posters	Pa	1-5	Linked to LP and possibly FG
Plastic packet-related posters	Pl	1-4	Linked to LP and possibly FG
Focus Group	FG	1	

3.7 Data Analysis

The analysis of the data I collected was done via a methodical coding of the data according to themes that emerged from the data in light of the research question and aims of the research. I read through the data considering what it presented in terms of knowledge, skills and practice, which were the three key elements to my research. While reading through the data, it became apparent that various categories could be identified. Using highlighters and coloured pencils, I highlighted the data according to the emergent themes which I have summarized in Table 2.

Table 2: Categories used to code the data

Key elements	Categories	Coding used
Knowledge	Prior knowledge	Purple highlighter
	Previously taught environmental knowledge	Yellow highlighter
	Knowledge accessed through the project	Pink highlighter
Skills	Method of accessing knowledge	Red pen curved line
	Potential sources of knowledge identified	Red pen straight line
Changes in practice	Change in practice linked to the project	Purple pencil crayon
	Use of knowledge afterward	Green highlighter
	"Passing the buck", not taking responsibility for actions	Blue highlighter
Realisation of shortcomings	Shortcomings explicitly noted	Pencil lines

3.6 Validity and Trustworthiness Issues

To ensure validity and trustworthiness of the data, I have ensured that all quotations have been taken directly out of the data, and the careful referencing of it will allow a reader to refer back to the original source so as to read the extracted data in the developing context of the project. This was important to me when tracking lines of development across the multiple data sets. It would be possible from the methodical system that has been used to return to the original recording if needed for the Focus Group and the interviews, and to quickly access the hard-copy data source to find the quotations in its context.

While I have used my first hand knowledge of the G9IERP to guide me on the types of data collected, I have done my utmost not to impose my informed opinion, but to try to work carefully with the evidence presented in the data. The analysis that has been done has been based on the data that was collected, and the evidence from this allowed for analytical statements to be made. These statements were made in conjunction with my supervisor, who ensured that the evidence was present in order for the statements to be valid. The conclusions and recommendations that have been made are based the evidence presented.

The wide variety of sources that were used for the data allowed the research into the G9IERP to unfold from various vantage points. This ensured that the analytical statements were not based solely on one form of data, but cut through a number of different sources, providing a triangulation of the data.

All data will be kept for a period of five years on completion of this research, allowing anyone who would like to delve into this research the opportunity to do so.

3.7 Conclusion

In this chapter I have presented the rationale for the research orientation as an interpretive case study. The methodology, including the methods used for data generation and analysis has been presented. I have considered issues of ethics, validity and trustworthiness that have been dealt with within the research. This careful framing of the study has enabled me to explore and to probe to the actual changes that were implemented in the boarding houses for the Life Orientation project. In sourcing the various data I was led to believe that this documentation was stored in the Life Orientation classroom, but discovered that this part of the project had no formal documentation produced by the learners. As I only discovered this after the interviews and focus group I was unable to deepen my investigation in this

direction. However, the posters which were created, in conjunction with the Focus Group data, shed sufficient light on the process so that it was not essential to this research to do so.

In the following chapter I will be presenting a careful reading of the evidence from each source of data, based on the source of the data and themes that were emergent from the data analysis. The interpretation and discussions of the findings are presented in Chapter 5.

Chapter 4 – Probing perspectives on the Grade 9 Integrated Environmental Research Project

4.1 Introduction:

In this chapter I lay out the data that was collected on the teacher perspectives on the content and project design for knowledge to be accessed by the learners (Section 4.2). The instructions on content accession in their project brief are then examined (Section 4.2) before evidence of the learner experiences of the project content and how knowledge was accessed (Section 4.3). The projects themselves are then reviewed for evidence of the knowledge acquired (Section 4.4) before considering how teachers and the learners report on knowledge and change that came about through the process (Section 4.5).

In order to remain true to the data, I have not edited the words used by participants in any way – the grammatical errors that occur in the quotations, particularly within the learners' work – is as it was presented in the source documents.

4.2 Teachers' Views – Semi-structured Interviews:

In this section I will be looking specifically at the content that the teachers wanted to cover within the Grade 9 Integrated Environmental Research Project (G9IERP) and how it was anticipated by the planners of this project that the content would be accessed by the learners – either taught to them or sourced by them. The final section also presents the teachers' opinions on how the learners actually accessed this content.

4.2.1 Planned Learning Area Content

Apart from Teacher 5, the teachers interviewed were all part of the planning committee who generated the project. The interview was semi-structured, with five key questions that were used as a baseline (see Appendix J). The following responses that have been extracted are in relation to the key question: "How did you plan your learning area's component of the G9IERP?". The majority of teachers did not answer the question as it stood, but rather focused their answers on what they saw their LAs focus of the project to be.

Some of the teachers had specific areas that they saw as being covered by the project. For instance, Teacher 2 (from Physical Science) had electricity usage and alternative energy sources as her focus in the project (TI3, l11 - 13), and the Life Orientation teacher (Teacher 6) said that she referred to the curriculum documents and used the assessment standards from the Life Orientation curriculum statements to generate the component done within her LA (TI6, l9 - l10 and l15).

Other teachers saw this project as being focused in LAs other than their own. For instance, the History teacher (Teacher 1) felt that this project was more related to Geography than anything else (TI1, l10), and that there was not much of History's curriculum contained within the project - "It didn't really have much of a History component" (TI1, l2) and "I don't really feel it had any History" (l6). The Natural Science teacher (Teacher 5) "… saw this as very much of a Geography-based thing we were asked to give up time for…" (TI5, l22).

Two of the teachers interviewed used this project not as an opportunity to cover the environmental outcomes in their LA, but rather as an opportunity for the learners to practice certain skills that had to be covered within the LAs' curricula. The Design and Technology teacher (Teacher 4) felt that the project was based in the History and Social Sciences and that his LA did not have an environmental component included within the project. The Mathematics teacher (Teacher 3) saw the Mathematical component being instrumental to "unpack and explore the environmental question they were asking" (TI3, l4 - l5). She noted that "…Maths wasn't specifically [assessed] in the project" (l34), but that it was used to summarize the data once it had been collected.

Teacher 7 was one of the key organizers of the project. She felt that the content that was decided on was "… a group effort of a pile of teachers" (TI7, l7), and "shouldn't have been" linked to any particular subject. "Some of [the topics] lent themselves to Geography, some of them would have lent themselves more to science, some of them more to Biology, depending on what they were" (TI7, l11 - l13), but in her opinion, "… probably the strongest link would have been the [Natural] Science." (TI7, l17 - l18).

4.2.2 Anticipated Methods of Accessing / Sourcing Knowledge Relevant to the G9IERP

In this section I consider the interview data for indications from the teachers as to how they anticipated that learners would be able to access the content that they would have needed to undertake the project. The key question that I have drawn the majority of the responses from is: "How did you plan or anticipate that the learners would access the content knowledge relevant to the project?".

I have divided the responses into those dealing with prior knowledge and those dealing with anticipated accessing of content knowledge.

4.2.2.1 Prior Knowledge

Teacher 1 began by saying that "… the [research] question was not going to need a huge amount of prior knowledge or content…" (TI1, l47) and she felt that "… [the learners] did have an understanding what it was doing to the environment" (TI1, l52). However, later in the interview, she came to the realization that there were shortcomings to her assumption - "… I don't know that they really had enough information on whether this really was a world wide problem." (TI1, l55 - l56). She also was under the impression that the understanding of the environmental issue that her class was studying had been taught by the Geography Department (TI1, l54 - l55). Towards the end of the interview, she noted that "we need to actually be really informed" about the environmental problems in order to act, rather than to just moralize (TI1, l83 - l89). She continued by saying:

> "… we need facts and figures to give more depth, and that goes to everything that we say. We need a depth that if we're going to do it, let's do it, and get the information, and lead them in a direction where they can find it" (TI 1, l91 - l93).

In her interview, the Physical Science teacher acknowledged that there had been a muddle in the facilitation of the class that she was focusing on, and felt that there had not been much content covered (in response to the question "Would you say what they were doing then was that they were collecting the data, rather than understanding why it was important to know how much electricity they were using?" Teacher 2's response was "Ja, I think it was, very much" (TI2, l47)). However, later in the interview, Teacher 2 remembered that she had taught a section on the topic previously, and she "… would have assumed that [content] knowledge as well. One assumes that having discussed the shortage of energy and that you need alternative energy sources that [the content knowledge backing the project] would have been apparent" (TI2, l57 - l59).

Teacher 3 felt that her Learning Area had provided the learners access to skills before the project began, "…that's where Teacher 2's kind of summary stuff beforehand was useful… my understanding was she put together a summary of the various types of things that might be used, and students has access to that" (TI3, l57 - l59).

The Natural Sciences teacher, in response to a comment that I was investigating whether the learners, at any point in the project, had been taught about the environmental knowledge needed responded: "… not from the Natural Sciences side, nothing, neither leading up nor post…" (TI5, l7), and she specifically noted that Natural Sciences did not teach anything regarding plastics, paper or water before the project (TI5, l17 - l22).

In response to a query on whether it was anticipated that the learners could have come into the project with background knowledge, Teacher 7 acknowledged that they could have (TI7, l41), but that due to the fact that there were a number of different topics, and this kind of knowledge was interlinked, so if a learning area was covering the topic, that was fine, if not and content was needed, then the learners were expected 'to go and find it out" (TI7, l41 - l44).

4.2.2.2 The Teacher's Anticipated and Actual Sources of Content Acquisition

All the teachers interviewed noted that the Internet was a potential source of content knowledge for the learners. Teacher 6 stated that she specifically gave the learners two Internet sources and expected them to come up with at least two further sources themselves (TI6, l49 - l50 and l53 - l57). She then instigated a sharing system – groups in her class researched on the Internet, and then reported back to the rest of the class, allowing each group to have access to the others' websites (TI6, l63 - l66). However, Teacher 4 noted that in some instances the class was left to undertake Internet research on their own, with no 'critical intervention' from the teacher (TI4, l71).

Teacher 7 felt that while most of the content was accessed via the Internet, rather than through books, magazines, newspapers or published articles (TI7, l46 - l47), it did not matter where the information was accessed (TI7, l39). Teacher 4 noted that source use was "…very patchy, some places they used books and they used teachers and they used the Internet and they went and talked to other people…" (TI4, l71 - l73), yet some groups wanted "…the teacher to tell them what to do, but not use them as an information source" (TI4, l65). Teacher 2 would have liked alternative sources other than the Internet to be used, such as newspapers, but felt that this did not happen (TI2, l43 - l44). Teacher 1 identified television documentaries as a potential source of information too (TI1, l105).

Another source that teachers anticipated would be used was talking to people (TI2, l39 - l40; TI3, l74 - l76; TI4, l58; TI5, l7 - l9). Teacher 4 and Teacher 5 noted that they felt that some groups had under-utilised this resource (TI4, l58; TI5, l16), and Teacher 3 remarked that if the learners were not in the

venue at the allocated time slot, they missed out on the opportunity to access the teacher as a resource (TI3, l74 - l76).

It was anticipated that one class would need to learn how to read an electricity meter themselves ("…they had to go and learn how to read meters and read it themselves for our specific project…" (TI2, l39 - l40), but that the cost of electricity was investigated by the teacher for the class ("they had to go down to the municipality to find… I was going to say cost of energy, but we did that for them…" (TI2, l41 - l32).

4.3 The Documentation and Handouts

Prior to the project, each class was given a two-lesson overview of a research process. The project facilitators were all given an overview of a research process from which to work and to take the learners through each step of the research process that was outlined within it (see Appendix A).

This overview was developed into the project brief which all learners had access to (see Appendix B), along with an assessment rubric to refer to (see Appendix C). The learners were also provided with an overview of what their project should contain (Appendix D), and a rubric for the assessment of the reflection (Appendix E). Life Orientation included a set of instructions and a rubric for a programme and poster that had to be created (Appendix F).

4.3.1 The Research Process and Project Brief

The project brief to the learners (Appendix B) provides a nine-step overview of the research process that the learners were to embark upon, which was worked through during class time by the project facilitators prior to the commencement of the project. In this section I have considered five specific areas of interest – Section 4.3.1.1 gives an overview of the contextualizing knowledge that was required along with the skills that were required to access/investigate this knowledge; Section 4.3.2.1 provides evidence of new knowledge that was generated through the learners' investigations and the skills that were required to present this knowledge; and Section 4.3.1.3 considers evidence around the specific change recommendations that were made through this project.

4.3.1.1 Contextualising Knowledge and Skills Needed to Access it

According to Appendix B, in Step 1 the learners were expected to identify and state a problem that they would like to research. The brief required them to contextualize the issue that was to be addressed by placing their research within the bigger picture, explaining why their research would be important. The implication that background research was required can be seen in the statement: "this is the area that some background research is always of use" (Appendix A, l11 - l12), and in the project brief given to the learners (Appendix B), this was made more explicit:

> "To do this you would find out if previous research has been done by anyone, what that research has found and so on. This is normally called a "literature review" – because we read already written material to find out what has been done on our topic. (referencing critical here)" (Appendix B, l9 - l13).

Linked to this, in Step 9 of the learners' project brief, the requirement that knowledge must be accessed from alternative sources is apparent, as both in text and end of text referencing is called for – meaning that the learners had to report on some kind of source material containing information pertinent to their research.

Appendix B provides a clear instruction as to how learners would be able to locate guidelines on how to reference their work in Step 9. Provision was made for specific assessment of the referencing via the rubric pertaining to the project presented (see Appendix C), both in text and end of text, ensuring that the learners knew specifically that this was required of them.

From Appendix D it is apparent that learners were expected to write a section within their project to contextualize the importance of their research question based on their prior knowledge and on outside sources and to ensure that the outside sources were fully referenced, while Appendix C indicates that this contextual knowledge would be assessed in the introduction to the project.

4.3.1.2 Research Skills, Generation of New Knowledge and the Presentation thereof

To generate new knowledge, learners were expected to undertake empirical field work (Appendix A, l27 and Appendix B, Steps 4 an 5) and gather data regarding their selected issue. Appendix A guides that learners in Step 6 to present their data in such a way that in Step 7 the learners could analyze these data to make sense of them – "once you have summarized your information you need to tell people what the

information you have gathered means' (Appendix B, l50), specifically in relation to the research question.

The skills for data presentation formed part of the anticipated use of the G9IERP for the Mathematics teachers. As Teacher 3 explained in her interview, when considering the focus of Mathematics in the G9IERP:

> "we helped them use the mathematics needed to unpack and explore the environmental question they were asking. So how to collect data, how to put the graphs together, would the graph be appropriate, how would they communicate their data, how would they summarize it, would it be valid" (TI3, l4 - l7),

and "most of [the focus] was in relation to ratios, percentages, graphs, summarizing the data, etc" (TI3, l29 - l30). Step 6 of Appendix B required the learner to present their data in a readable format, thereby making use of the skills that Mathematics wanted to cover in the project.

Step 7 of Appendix B required the learners to "explain how the information on the graph helps you to answer your question", suggesting that the skills of interpreting the data and linking back this new knowledge to the prior knowledge that lead to the development of the learners' research focus in the first place had to happen.

Appendix C shows clearly that the knowledge generated through this section of the project would be assessed in the Presentation of Results and the Analysis of Results sections.

4.3.1.3 Recommendations for Change

With regard to knowledge acquisition and change, Step 8 requires the learners to make some kind of recommendation in response to their research process and findings.

Part "a" of the conclusion and recommendations section in Appendix D calls for recommendations regarding the research process - i.e. expecting the learners to develop their skill of reflexive learning ("how could I improve my research process").

Part "b" notes that a reflection and suggestion on "how can you implement your research findings to improve the world around you?" (Appendix B, l66 - l67) is required. In the project structure instructions (Appendix D), under the 'conclusion and recommendations' section it was noted that the

recommendations that the learners made in this step was linked directly to the work that was done in Life Orientation (LO) at the time, and it was assessed as part of the Life Orientation programme (see Section 4.3.3).

The proposed sustainable change that learners were required to suggest and implement with regard to their research would be assessed through the Life Orientation project, and this I have explored in the Section 4.3.2.

4.3.2 Life Orientation

Running concurrently with the G9IERP, Life Orientation undertook an activity in which their specific Learning Outcomes were covered, which linked directly to the research being undertaken within the G9IERP. Each class was given the same topic that was being covered by the G9IERP, and was required to develop a programme within each of the boarding houses to address a problem regarding the topic being researched. Appendix F shows the requirements for each class for this activity.

With respect to content, the Life Orientation handout gave the learners an extract of the human rights with regard to the environment, and a list of websites worth visiting. While the task itself as stated on the handout did not specifically require the learners to have anything other than prior knowledge, the rubric required that there was "evidence of websites being used and referenced" (Appendix F, p. 6).

While in some instances, the instructions included a directive to actually implement the programme in the houses ("implement ways of conserving water in the House" (Appendix F, p. 1) and "allocate a person in each House to collect waste as well from the printing departments and other areas of the school" (Appendix F, p. 2)), in other cases the instructions were not specifically worded to require implementation, but only development of a programme – "develop a programme whereby you collect and save plastic bags within your House and the school for the direct purpose of recycling" (Appendix F, p. 5). However, the rubric shows that each programme had to be implemented in the houses over a 20 day period (Appendix F, p. 6).

The programme that was developed by the learners in Life Orientation was allocated a section in the assessment of the entire G9IERP, as shown in the rubric (Appendix C, p. 2) and noted earlier (Section 4.3.1.3).

4.4 The Learners' Views on Knowledge Accessed Pertaining to the G9IERP – Focus Group Data

The purpose of the Focus Group was to retrospectively explore where learners had accessed their knowledge about the issues they had researched during the G9IERP, and to see if they acknowledged that they had changed their practices since undertaking the project due to the knowledge they had gained through this project.

The learners were quick to identify that Life Orientation and to a lesser extent Geography were the two learning areas through which they felt that much of the knowledge pertaining to the environmental issues was gained leading up to the G9IERP (in FG1, l38 they say "LO, in LO, ja, and Geography). In considering the other subjects that were involved, they felt that in Afrikaans (for many of them this is their First Additional Language) they did not have the vocabulary to learn a lot, and that for Mathematics teachers it was quite difficult to teach about the environment, although one of the learners in the Focus Group noted that there was a facility to recycle paper in one of the Mathematics classrooms (FG1, l41 - l44), but that the teacher had not told her class why it was important to do so.

In exploring the idea of Life Orientation as an area of learning which aided their understanding of the issues researched through the G9IERP, they explained that they had done "a whole environment thing. A poster" (FG1, l56). They noted that they had been given a handout with a selection of things that had to be included on the poster (FG1, l69), and felt that their teacher had not given them the information pertaining to this, but that they had accessed this from the Internet (FG1, l61 - l64).

Teasing out Geography as an area of learning in which knowledge had been accessed for this project, some learners felt that their Geography teacher had not taught them anything in this regard (FG1, l72); another stated that "we were just made aware of it" (FG1, l74). One learner felt that no details had been given (FG1, l77), and another noted that through use of the news that was discussed in the classroom some of the issues had been discussed (FG1, l78 - l83).

Throughout the Focus Group, the learners noted that much of the knowledge that they had was general knowledge ("everyone already knows" (FG1, l2), and "general knowledge that you just know" (FG1, l4) being two examples of this). There was also acknowledgement given to knowledge that was gained earlier in their schooling, such as watching Al Gore's The Inconvenient Truth while in junior school (FG1, l118 - l122), as well as alternative media such as advertising (FG1, l3 and l117), visually seeing wastage

happening around them (FG1, l10) and to continually being told to do something about this (FG1, l12 – l13, and l44 - l46).

4.5 The Learners' Projects – Evidence of Knowledge Acquisition

In the learners' projects, I have looked for evidence of prior knowledge (including both general knowledge and knowledge that has been taught to the learners by their teachers) and of knowledge that has been accessed through research by the learners themselves. The latter I have divided into two parts – the knowledge that was gained to contextualize the project, and the knowledge that was created by undertaking the project itself.

4.5.1 Prior Knowledge

Much of the prior knowledge can be found in the first stage of the project - where learners had to individually come up with and justify a proposal for the research they wished to undertake – an individual version of Step 1 from the project brief. I have identified these by their broad, sweeping generalizations, and provided a few examples below.

In contextualizing the plastic bags issues, one learner wrote: "the problem is the amount of plastic bags that are being used for one thing and then wasted and becoming a huge litter and pollution problem throughout the world" (LP1, p. 62). Another learner felt that "The problem is that people don't realize that plastics are damaging the environment, and lots of people throw them around which results to the damaging of plants, and some animals are die. Plastics are ruining our environment" (LP2, p. 8). One learner noted that she had "… been taught that plastic bags damage the environment because they take thousands of years to decompose" (LP2, p. 3), and she knew that "if they reach the sea they are a hazard to marine life", "they do use oil to make [them]" and that "a reusable heavy duty bag is better".

The paper usage issues projects brought up similar statements:

> "…we do not realize how much paper we use in the school environment and we need to wake up to the fact that not only do we use to much paper we also waste a lot of paper. Thousands of rainforest and forests in general are cut down to make paper. These forest are cut down to make paper we take for granted and waste it without even thinking about it. We need to become more aware. We need to recycle more, use

more recycled things, write on both sides of the page, if you make a mistake erase it instead of starting all over again on a new page." (LP3, p. 35)

In the same project, another learner wrote:

> "The task is to research the usage of paper as it is being overly used and not recycled enough which gives people an excuse to cut down trees, which when done to much, can damage the environment." (LP3, p. 34)

A third learner in this project contended that it was important to address the amount of paper being used at the schools as:

> "…hundreds of rainforests are cut down every day to make paper. This paper is often wasted. Trees are homes to many animals and insects and with out some of these bugs and animals we cant survive. Think about it this way – we have our plant, the producer. The plant makes its own food. Say this plant is a tree/shrub. Buck will come and eat off this 'plant' so that they can survive. Then here come the humans, and they hunt the buck. We then eat the buck and that's how we survive. If that tree was not there for the buck to eat from, the buck would die and there would be nothing for us to eat. We also eat fruit. Most fruits are from trees. Without trees, there would eb no fruit and then again there would be less food for us. So all in all we cant survive with out trees. That is why it is getting very important to recycle and to save trees. Trees are also our main provider of oxygen. With no oxygen we cant breath. TREES ARE IMPORTANT! … Out main use for trees now a days is to make paper, and if we can recycle paper we might save a forest of trees." (LP3, p. 33)

In their contextualizing, individual proposals, a number of learners noted a link to climate change - that too much paper wastage "is a huge contribution to the crisis of Global Warming" (LP4, p. 25), and "paper being wasted is becoming a bigger problem due to global warming" (LP4, p. 29).

4.5.2 Contextualising Knowledge Accessed Through the G9IERP

To identify contextualizing knowledge that was accessed via the G9IERP, I looked for statements that were in text referenced – indicating that they had been sourced externally –and for statements in which

the learners noted that research had shown what they were noting. The majority of these statements arose in the group introductions of the projects.

The group that created the source LP1 provides clear evidence of lots of research and accessing of knowledge relevant to the project in their introduction. Their contextualization is full of facts relating to plastics packets – for instance:

> "… the plastic takes up to 1000 years to be broken down and 4 trillion to 5 trillion plastic bags are made each year. However, when plastic decomposes in the sea, it does not get completely broken down. It photo-degrades. This means that it gets broken up into tiny pieces of plastic until it eventually becomes plastic dust." (LP1, p. 12)

And

> "According to John Roach (National Geographic) September 2, 2003 ed, the pastic bags 'clutter landfills' and 'flap from trees'. 'They float in the breeze. They clog roadside drains. They drift on the high seas. They fill sea turtle bellies.'" (LP1, p. 12).

This group also put in a section on 'facts about plastic bags' (LP1, p. 14), in which they noted, amongst other things, that "it costs more to recycle plastic bags than to create new ones" (LP1, p. 14).

One learner, in her individual proposal, provided a number of referenced facts about the damage that plastic bags cause, and why using reusable bags would be good for the environment, which she then used to justify the reason why her proposed project would be so useful (LP1, p. 60). The group as whole noted the websites that they had accessed in their reference list – LP1, p. 21.

LP2's creators also provide evidence of seeking knowledge relating to plastic bags – in one individual proposal, a learner noted that "60 - 100 million barrels of oil are used to make the worlds plastic bags each year", and that "somewhere between 500 billion and a trillion plastic bags are consumed world wide each year", and that "100 000 plastic bags are found in the sea every year" (LP2, p. 1). This learner provided the URLs of the websites that she obtained the information from.

Another learner in this group noted that "plastic bags are not bio degradable, but they are cheaper, where as paper bags are more environmentally friendly – they cost slight more and material bags are expensive, but people can reuse them" (LP2, p. 1). A third learner referred to research that showed that

"plastic bags are most used in the packaging sector", and "plastic production requires much recourse such as fossil fuels… Most plastic products are non-degradable, so they take a long time to break down, sometimes even hundreds of years" (LP2, p. 4). Yet another learner refers to research which shows that "plastic bags are being used more often in the shops instead of ones made from material… South Africa is … charging their customers for plastic bags but they are so cheap that customers do not really mind buying another one to use" (LP2, p. 5). While these learners say that they are referring to research that has been done, there are no in text or end of text references to validate their statements.

The third group's project contained a section on "recycled paper vs. non-recycled paper" in which they noted a number of facts pertaining to these. Statements include:

> "When 100% clean of ink the paper looks exactly like non-recycled paper but the less cleaned the paper the better it is for the environment.
>
> The cost difference between recycled and non-recycled paper is actually none … and it can take up to 90% less energy to produce recycled paper.
>
> The quality of recycled paper has to be approved before it is given the eco-friendly label and can be used in any office machinery.
>
> Some people estimate that by recycling just half of the world's paper used per year could save up to 80 000km^2 of forest." (LP3, p. 13)

This group provided a bibliography of where their information came from – LP3, p. 14.

The fourth group's project that I examined showed little evidence of any knowledge being accessed other than general knowledge. One learner provided a website reference for her general note:

> "Millions of trees are cut down every day to make paper and if you just throw that piece of paper into the dustbin and not recycle it, how many trees will there be in years to come? There won't be any!" (LP4, p. 30).

4.5.3 Created Knowledge

In this section I looked for evidence that knowledge had been created through the investigation that learners did within the local environment. I wanted to see if they had managed to create new knowledge through the implementation, synthesis and presentation and analysis of their questionnaires.

In three of the learner projects there is evidence of questionnaires that were created and implemented in the various contexts of research. In LP1 (pp. 43 - 44) and LP2 (pp. 14 - 15) learners had clearly identified two groups of people that they intended to interview (customers and managers), and designed questionnaires for each group. The questionnaires aligned with their intended goals of the research stated in their proposals. For instance, if one looks at LP1, p. 16, one of the intended research areas was to find out "would people buy/use material re-usable bags if they were the same price as plastic bags and if so, why?", and one of the questions to the public was "If re-usable bags were the same price as plastic/brown bags would you buy re-usable ones?" followed by the question "why?". LP3 listed their intentions of their research (p. 2), namely to investigate recycling of paper that happens on the school campus, and designed a questionnaire (p. 7) in which the questions are specifically created for this purpose.

LP4, however, failed to produce a combined proposal, and appears to have attempted to research each individual's proposal within the project, rather than finding a common goal. The survey that was done (LP4, p. 6) appears to bear no relation to any of the individual proposals, and while a number of the individual proposal indicated that an investigation into the potential saving of paper by the school through increasing email correspondence would be useful, on p. 11 the learners note that emailing is already happening, and gives some facts regarding the saving of paper in this regard, but with no indication of how this information was gathered or the implications thereof.

Each of the learner projects show evidence that the learners were equipped to take numeric information from the questionnaires and to graph it. If one follows through with the example regarding re-usable bags, there is evidence that the learners had created bar graphs showing people in different age brackets who used or did not use re-usable bags (LP1, pp. 22, 25, 27), and attempted to create a chart showing the reasons why these people had made their choice (LP1, pp. 23, 26, 29). The latter graphs are incorrect in that the learners have used a bar chart representing an either / or scenario – for

example, either price was a reason why the customer bought a bag, or the price was a reason why the customer wouldn't buy the bag – when the data could have been better represented in a pie chart.

However, the open-ended questions, such as LP2's "If plastic bags were banned what would you do?" (p. 14) and LP1's question asking managers what would convince them to replace plastic bags in the shops with re-usable bags, were not presented in any format whatsoever.

There was evidence that learners were able to interpret what the data they had graphed meant. LP1, p. 18 shows evidence that learners realized that according to their data many townsfolk prefer to use material bags to plastic ones, and that there was a discrepancy between women (who were more likely to reuse material bags) and men (who were more likely to buy another material bag on their next shopping trip). In LP2, p. 23 an apparently contradictory statement emerged from the group's data – "more people use plastic bags rather than material or paper bags".

In some instances graphs were not needed for presenting the findings, and simple statements pertaining to the meaning of the data were made; for instance LP2 learned that one local shop sells around 5000 plastic packets a day, and they also noted that their school did not provide facilities to recycle plastic packets.

LP3, having designed a detailed questionnaire regarding thoughts on paper recycling (p. 7), and graphed each question onto one set of axes by grade (p. 9) then summarized their analysis into two main statements on p. 11, noting that there were paper recycling facilities at school, but that not many people were aware of this and this was the cause of the low recycling levels around the campus. They noted that the boarding houses did not have facilities for recycling paper.

Thus there is evidence that learners gathered data about their local communities and were able to interpret what this data meant, thereby creating new knowledge.

4.6 Views and Opinions on Knowledge Acquisition and Changed Behaviors – Semi-structured Interviews, Learner Projects, and Focus Groups

In this section I have looked at the views and opinions expressed in the various data sources that show a desire on the part of the learners to change their behavior patterns, or encourage others to change their behaviors based on the knowledge that they accessed or created through the project.

4.6.1 The Teachers' Opinions – Semi-structured Interviews

I have examined the semi-structured interviews for any indication that the teachers used the knowledge after the project was completed in order to do anything with it, and whether they felt that the learners had done anything with the knowledge that they had gained through the experience.

Teacher 1 noted that "the project had a lot more potential… I thought it was so useful, but then it went nowhere" (TI1, l57 - l58). She felt that it didn't "really filter into [the learners'] conscientiousness or the conscientiousness of the school" (TI1, l61). In response to a question about loosing the potential to use the knowledge further, she felt that we had "definitely" lost the opportunity to do so (TI1, l63). She felt that the learners had presented some "interesting ideas about trying to cut down on paper, but it's gone nowhere" (TI1, l78 - l79). She noted that she had done nothing with the new knowledge that was created through the project (TI1, l97).

Teacher 2, the Physical Science teacher whose class had focused their G9IERP on energy consumption, referred to a project that her learners had done on alternative energy sources after the G9IERP had been completed. She was ambivalent about whether or not the learners showed signs of being more aware of the issues they had dealt with, starting with "I think they are aware, more aware than they were before" (TI2, l65 - l66), but ending with "I don't think they are particularly aware of the situation. They are not making an effort" (TI2, l67 - l78). She had not encountered any discussion between the learners regarding the content of the project (TI2, l73), and did not know if anything had been done with the knowledge that was created via the project. She noted that she was not part of the assessment process (TI2, l82 and l85), but noted that there was "more reference done to recycled plastic" (TI2, l87), and that some further projects had been done for the Science Expo that could have been inspired through the G9IERP as they appeared to have a link to recycling plastic (TI2, l87 - l92). She reflected that the following year some of the learners that had been in Grade 8 while the Grade 9s were researching had produced Science Expo projects that were linked to energy consumption in the houses, which she felt might be an indication that there was discussion regarding the G9IERP that she had not been aware of (TI2, l92 - l94).

Teacher 3, the Mathematics teacher, noted that nothing had been done within the Mathematics Department with the knowledge or data gained from this project (TI3, l82 and l89 - l95), and that it could have presented an exciting opportunity to engage with the content (TI3, l93 - l95). She felt that "there was a consolidation process afterwards that didn't necessarily happen" (TI3, l88), and that she

felt it was quite important for the learners to "perhaps write up or publish a little thing in Grocott's related to their findings, but that never happened" (TI3, l86 - l87).

Teacher 4, who was a Housemaster at the time as well as a parent of a learner who did the project, felt that there had definitely been discussion about the project after its completion, but that the amount of reflection by the learners depended on who the teacher had been (TI4, l84 - l87). He recalled that it had been "stimulating, even kids not in the sort of class that was firing … and there was a degree of kind of heading towards critical mass" (TI4, l89 - l91), but that "there was a lot of implementation hesitation from the teachers and from the kids, not really knowing what was next and what to do" (TI4, l92 - l93). He noted, however, that nothing had actually been done with the actual content of the project in his classes after its completion, and that when he made passing reference to it later on, the learners had what he called "subject fizzle – they were quite tired of it" (TI4, l118 - l119).

Teacher 5 noted that "most people will throw things into the recycling box" if it was available (TI5, l35), but would not commit to the action being linked to the project.

Teacher 6, a Housemistress at the time, noted that she had given the Grade 12s a project to do in the house, but that the Grade 9s had been integral in initiating it and carrying on with what the Grade 12s had started. She felt that this was evidence of the learners engaging with the knowledge from the G9IERP (TI6, l70 - l73). She also acknowledged that her own personal practice had changed with regard to recycling paper (TI6, L77 - l78), but that she had done nothing further with the knowledge accessed and generated through the G9IERP (TI6, l85). She noted that the learners in her Life Orientation classes had given no indication that the knowledge was being used in other classes, which she felt was quite telling, but that they had shown a keenness to engage with the project itself (TI6, l95 - l97).

Teacher 7, one of the co-ordinators of the project, had hoped that the knowledge generated by the G9IERP would be used more widely throughout the school – for instance by non-academic departments, or the houses (TI7, l50 - l51), but that there had been no plan for this to happen (TI7, l55). She felt that there had been a little discussion of the project after its completion, and stated that 'other staff members seemed to think that there was more [discussion]" (Ti7, l61 – l63). She had not noticed any changes in practice in the classroom that she felt could be linked to the project (TI7, l69), but felt that more learners were aware of the issues (l 72). However, she suggested that children who embarked on environmentally-linked practices possibly learned these from home, and that others who don't might

feel that money could solve every problem (TI 7, l74 - l76). She would not like to stake a claim that the project had changed behaviors (TI7, l73).

4.6.2 Plans for Knowledge–Based Change Behavior Noted in the Learner Projects

The Learner Projects do not make specific reference to the changes in behaviour that the learners proposed in response to the knowledge they gained for their areas of concern. While the project brief calls for these (Step 9 – "Recommendations – must have these in relation both to actions to be taken on the ground and also wrt the research process" (Appendix B)), from absence of such recommendations in many of the Learner Projects, it would appear that learners used the Life Orientation route to present their ideas more fully, as the rubric for the projects noted "Assessed with the Life Orientation rubric given" (Appendix B, p. 2), and Life Orientation section specifically called for these (see Section 4.3.2). However, in the learners' individual reflections, there is some indication as to a desire to change their own practices. I have looked at the proposals, the brief recommendations that were given and the learners' reflections to provide evidence of an expression of a desire to change.

There are a number of broad general statements of action that should be taken before the research even began, such as in one proposal "we need to get as much information as possible so we can try and make new and more efficient ways of using paper in our every day lives at [the school]" (LP4, p. 1), and its associated flow chart – "find solution to help paper wastage… people use paper efficiently" (p. 5). In a request to the Head of the school to undertake the research, the group in LP3 notes that:

> "…this research will benefit the school which will help us find solutions to problems that occurred with recycling. We will therefore be able to improve the usage and recycling of the paper at school and alternatively help to lead the school toward more environmentally friendly and effective approach to the usage of paper" (LP3, p. 5)

This group realized through their project research that there was not enough awareness of places to recycle paper at the school, and recognized a "need to raise recycling awareness at the school and inform everyone where and how to recycle" (LP3, p. 11), and that they "…must work on a way to bring recycling into the [boarding] houses to that it is easy and accessible …" (LP3, p. 11)

Learners in LP4 proposed that to reduce paper wastage, "at the end of each year, boxes will be placed in tutor classrooms and students will be told to bring their workbooks with remaining blank pages" (LP4, p.

14), but there was no indication as to what would become of the workbooks and their blank pages, or who would be responsible for putting the boxes in the classrooms or collecting the paper afterward.

A second suggestion by this group was to cover text books with plastic to make them last longer, and to place "paper only" bins around the school (LP4, p. 14).

The girls who produced LP2 felt that because 'a lot of people say that recycling plastic bags in not accessible and easy … recycling should be advertised more and be made easier" (LP2, p. 24). Their proposed solution was that they could "…help the world by giving people the opportunities to recycle. To do this we could put bins around the towns and in the schools. This would make the environment clean and plastic free. We could tell many people about how bad plastic bags are and that they should not burn or throw them away" (LP2, p. 24).

One learner had a personal solution – "Now I know that instead of throwing away plastic bags or leaving them in the streets I should recycle them by bringing them along every time I go shopping because there is also a lot of pollution that is done just to make them" (LP2, p. 29). Another learner in this group states "I will definitely recycle from now on" (LP2, p. 31).

The learners in one group noted in their conclusion that it would be useful "if material bags were made cheaper, more comfortable, more eco-friendly and you could pick sizes", but offered no solution on how this could be done. One learner offered a practice change solution at a more practical level – "As a school I think we should have a system where we have special bins for plastics bags to that we can start recycling" (LP1, p. 10).

One learner noted in her reflection on the project that "I'm really glad that some people know the danger but what really scares me is that the majority of people don't care some don't know and the environment is getting ruined" (LP2, p. 26). However, she offered no indication as to any solution to this problem.

4.6.3 Focus Groups – Opinions on Knowledge-Based Change Behavior One Year Later

The Focus Group was adamant that the project, once completed and handed in, was not referred to in any of their classes, but they were also as quick to note that they felt that they had changed their consumption patterns for either plastic bags or paper.

One learner noted that "when I got a plastic bag from [a shop] I'd keep it in my pocket" (FG1, l149), and another said that she bought the stronger, material bags to use (FG1, l152). One of the learners who had been in a paper research group noted that her consumption pattern for plastic packets had not changed, but that "I have a box that I put all my scrap paper in" (FG 1, l154) and then she places this box at the communal collection point at the end of the year.

As the Focus Group progressed, however, a slightly different picture began to emerge among those learners who claimed to reuse their plastic bags – when asked how frequently the girls managed to reuse them, the acknowledged "not that often, but I do try" (FG1, l166) and "The thing is, though, I think about it. But you just forget these things" (FG1, l167).

The girl who claimed to recycle paper was backed up in her statements, and was even acknowledged as a driving force in recycling paper in the boarding houses: "Learner B keeps on telling me and everything" (FG1, l174), and Learner B herself said "Ja, this box, I tell everyone in the study cubes, I tell everyone they must just use this box. So whenever I have paper I know I've used, I put it in the box" (FG1, l175 - l176).

All the learners in the Focus Group felt that they tried to make people aware that they should change their practices, and that they explained to these people why it was important to do so (FG1, l177 - l190). However, while they acknowledged that the G9IERP had played a role in this, they felt that the reason for this was much broader – based on a whole variety of things, summed up in the statement by one learner: "It all builds up, and then you start realizing that you have to do something about it" (FG1, l196). They also noted that not everyone was willing to change their practices ("I speak to other people and they just say 'so'?" (FG 1, l202).

The Focus Group felt that there was definitely a gender bias toward action – "It's also a lot of boys, … they just say 'so'. Like if someone wastes food, I'm like "you can't just leave it there" and they're like 'so?', and it's normally boys." (FG1, l209 - l211). A discussion on whether this could be that the boys had a different focus in their projects, namely electricity and water, resulted in the Focus Group noting that even in that area, the boys have not mentioned saving water or electricity, but that as individuals they (as a group of girls) were aware of the issue, and consciously practiced saving electricity (we always switch off lights… Ja, everytime I walk past a light I switch it off… We unplug phone chargers and other things that use electricity" (FG1, l299 - l233).

In FG1, the respondents held a discussion before I could join them, and one of the respondents noted that “there are things around the school that … you must put your paper into scrap paper” (FG1, l12 - l13), indicating that action regarding this project is continuing on the campus.

It is also interesting to note that the learners remain interested in the topic that they studied, and continue to absorb information about this. In a discussion prior to the Focus Group beginning the group discussed a presentation which was given to them during a prefects’ assembly on “the state of the earth” (FG1, l22) which focused on the paper issue at school. The discussion indicated that there was still an intention to change being spoken about (“how you must convert paper” (FG1, l22) and “they provide boxes for scrap paper around the school, it’s good because it makes us aware that we have to recycle paper” (FG1, l23 - l25)).

4.7 The Posters – Promoting Change in the Relevant Community

As mentioned in Chapter 3, many of the posters that were created to promote change regarding the learners’ focus area were simplistic posters suggesting that recycling needs to happen. As noted earlier in Chapter 4, however, it appeared that due to a lack of recommendations presented in the Learner Projects learners had chosen the Life Orientation route to present their proposed changes, rather than to present them in their written projects. This section explores the changes that were proposed in the Life Orientation posters.

Three of the posters (Pl4LP2, Pa4LP4, and Pa1LP4FG) suggest that by recycling paper or plastic bags we will save our lives by keeping the world clean.

One poster, Pa4LP3, promotes recycling as an option as “it’s what makes a difference”, and it provides two short descriptions of what happens when we choose not to recycle – namely increase in pollution from paper factories, and degradation of biodiversity through deforestation.

One poster, Pl3LP2, suggests that we should not use plastic bags at all. The poster shows the world wrapped in a plastic packet, and a woman sorting through a pile of plastic packets, and states boldly: “Say no to plastic bags”.

Pa3LP3FG calls on people to make a choice to recycle and to not litter. The poster presents an argument that “future generations have the right to a clean environment and we should be giving them that chance”, and that the animals on the plant depend on us to “keep our environment clean”.

A poster promoting reducing, re-using and recycling goods was created to challenge the audience to prove their worth. It presents the responsibilities to keep our environment clean and to 'promote conservation'. It balances this with the rights to a healthy environment and to one protected for future generations. There is a picture of a plastic packet gleefully suffocating the world that has a speech bubble calling for help.

Pa5 (the poster specifically selected for the argument it presented), provides a researched argument for the recycling of paper, and presents two solutions to start combating the issue. It links paper usage directly to global warming, acknowledges that this is not the only cause of global warming, identifies some of the side effects of global warming, and then suggests that by making a small effort together, can make a difference on a large scale. The first solution is to start recycling paper on a small scale on specially demarcated dustbins in the classrooms around the school; the second solution is that as a school we should use recycled paper only.

Thus the majority of posters simply instruct the reader to recycle in order to 'save the world'. A few posters encourage the reader to re-use (or to not use), reduce and recycle, but do not explain how each of these would help, or where recycling happens (or could happen). They do not show where one can recycle or how it could be taken forward. None of them link back to the research within the communities that was done.

Thus there is only one poster, Pa5, which provides what the G9IERP called for – recommendations of "action to be taken on the ground" (Appendix A, l41 - l42), and "how can you implement your research findings to improve the world around you" (Appendix B, l66 - l67).

4.8 Conclusion

This chapter has served the purpose of presenting the data from the research in a valid and trustworthy fashion using coding that allows the reader to track it back to its source – the original documents or the voice recordings of the interviews and Focus Group.

It has been set out in a logical manner which takes the reader through the G9IERP process, from its intentions at design, through the implementation of the research by the learners, to the proposed actions for the communities involved.

The data has been presented in such a way that the reader could possibly draw differing conclusions to those which I have. However, it is my intention in Chapter 5 to present an analysis of this evidence with a view to bringing the readers' interpretations and mine into alignment.

I have drawn on the literature presented in Chapter 2 as lenses through which to consider the evidence. I have looked to the evidence to provide examples of the key facets contained in literature review, and by doing so have woven a thread linking the literature with the evidence into a coherent analysis of the G9IERP. Through this analysis I have considered the over-arching research question – has engaging learners in research of a local environmental issue led to knowledge-induced sustainability change?

From this analysis I have presented a brief summary of my findings, and have reflected on these in order to offer suggestions for my final key question – what measures can be taken to improve the implementation of this project in the future?

Chapter 5 – Review of Emerging Contradictions and Tensions

5.1 Introduction

5.1.2 Overview of this Chapter

In Chapter 4 I have presented the data that emerged intrinsically from the source material through themes – what the teachers had to say about accessing content for the Grade 9 Integrated Environmental Research Project (G9IERP), how the documentation given to the learners spoke to this, what the learners recalled that they had done, and what the projects that had been submitted by the learners indicated had been done. In this chapter I will be analyzing this evidence in light of three of the key research questions presented in Chapter 1 – namely:

- How was it anticipated by the teachers that orientating content and skills relevant to the G9IERP would be accessed by the learners?
- How is knowledge accessed via this project, and/or created by this project?
- Is there any indication of knowledge-induced change within the learners?

To do this I have looked to the evidence presented in Chapter 4 to identify analytical statements, which help to focus the discussion of the findings in terms of these key research questions in light of the literature review in Chapter 2.

Following each of the analytical statements, I reflect on the evidence in light of the literature review to present the contradictions that emerge from each. In Section 5.7 of this chapter I explore this terrain of contradictions in order to unearth the fundamental axes of tension between the intentions of the investigation and the actual outcomes thereof with a view to presenting recommendations in Chapter 6.

5.2 Accession of Contextualizing Knowledge and Skills

Reflecting on the data evidence from the teacher interviews as presented in Section 4.2.1, all the teachers involved had varied intentions for their LA; some LAs were focused on the content (for example Physical Science was focused specifically on energy use) while other LAs were focused on particular skills (for example Mathematics was focused on graphicacy). In Section 4.2.1.1, evidence from one of the co-ordinators of the project, Teacher 7, shows that intention of the project was not to link the content to

any particular learning area, and in Section 4.2.2.1 she suggests that while there were a number of different topics under consideration by the learners, they all had areas of interlinked knowledge. Considering Jansen's (1998) criticism of compartmentalization within OBE, from the teachers' perspective, it is apparent that this project's knowledge was not organized around discrete competencies and this hints at the complexity involved in designing a project with such a broad focus.

Despite this complexity, looking across the evidence presented in Chapter 4 and it is apparent that learners had access to prior knowledge that allowed them to contextualize their individual projects on a broader scale, and/or were provided with skills on how to access this and further knowledge from alternative sources, such as the Internet. This gives rise to my first analytical statement:

> **Analytical Statement 1**
> It is evident that there was provision of previously taught content knowledge and skills needed for the learners to contextualise their research.

There is evidence in the teacher interviews that it was anticipated that the learners were expected to draw upon their prior knowledge. As noted in Section 4.2.1.1, the Physical Science teacher gave the learners direct access to the content through lessons taught leading up to the project, however Teachers 3, 5 and 7 expected their learners to access this content themselves. Teacher 7 (TI7m, l41 - l44) clearly had the impression that if learners did not already have access to background knowledge regarding their research, they would have sufficient research skills to find out about it.

In the project brief there is evidence to show that it was anticipated that learners would access further knowledge from external sources to contextualize their projects, and in all the learners' projects that were considered in this research, there is evidence to indicate that the learners had sufficient skills to do so. This suggests learners were charged with leading their own learning experience in terms of contextualizing their projects, and that the teacher took a 'back seat' in terms of not teaching the knowledge specifically, providing an example of the learner-led new education system to which Mason (1999) and Beane (1991) alluded to.

Teacher 4 appears to be critical of this kind of research, noting that he witnessed some of the learners being left to research this section of the project on their own with no 'critical intervention' on the part of the teacher (TI4, l71). In Beane's (1991) view, this suggests that the particular teacher under discussion had relinquished the role of instructor, but had not stepped in to the role of guide and

facilitator either. However, it is evident that Teacher 6 created a space for learners to report back on the Internet sites that they had visited, allowing for facilitation at this point in the process. Thus across the grade, between classes, learners were exposed to different styles of facilitation with regard to their accessing contextual knowledge.

As mentioned in Chapter 2, Mason's (1999) defense of OBE in South Africa calls for a balance between the three knowledges he terms propositional, procedural and dispositional. It is clear from the evidence presented that there were sufficient procedural skills available within the groups to access propositional knowledge, either by teachers supplying this in earlier lessons and the learners drawing on this and other general knowledge, or through searching for it the Internet. However, as TI4 suggests, this could possibly have been improved upon with some assistance from the project facilitator.

Stevenson (2007b) makes an interesting point that by allowing learners to access multiple sources of knowledge, they come across conflicting information, forcing them to become critical interpreters of the information that they access. One of the criticisms of the contextualizing knowledge accessed by the learners as a common theme emergent through the teacher interviews is that the majority of learners only accessed one source for this knowledge – this was the Internet; the evidence in the Learner Projects aligns with this. This suggests that the potential for becoming critical interpreters over a broader source-base may have been missed.

However, there is clear evidence within the Learners Projects that conflicting orientating knowledge was actually sourced – LP2, p. 1 states: "somewhere between 500 billion and a trillion plastic bags are consumed world wide each year", and LP1, p12 notes that "4 trillion to 5 trillion plastic bags are made each year". Clearly within and between the two projects, there is extremely variant data that has not been critically analyzed by either group, or the class as a whole. Stevenson (2007b) notes that technology (in this case the Internet used to access the seemingly contradictory information) "can be used either to maintain meaningless and low quality learning or to support a thoughtful and skillful teacher in facilitating authentic and challenging learning" (p. 276). While there is no doubt that the information presented in LP1 and LP2 helped the learners as individual groups to understand and orientate the issues they were interested in, the potential for critical interpretation of this orientation knowledge between the two groups or as a whole class was missed out on. Stevenson (2007a) recognizes that in order for this issue to be addressed, the role of the teacher needs to be radically altered, although he offers no specific suggestions as to how this could be done, and the facilitating role

that Beane (1991) suggests as a way to enhance this kind of learning experience possibly did not reach its full potential.

When one considers Teacher 6's stated approach to accessing knowledge from the Internet, her facilitation of this process appears to be well thought out. Not only did she provide learners with a starting point, but she expected them to report back to the class on what they had found, ensuring that if conflicting knowledge had been accessed (as was the case in the projects LP1 and LP2) and reported on, there would have been a platform on which these could have been aired. The interaction between teacher and learner in this instance is a good example of le Grange's (2004) and Stevenson's (2007b) critical engagement that they identified as being critical for sound knowledge generation. It is interesting to note, however, that the learners involved in LP1 and 2 were, in fact, under the guidance of Teacher 6. It is possible that a discussion revolving around the contradictory statements ensued and no conclusion was reached, or that these particular data were not presented to the class for discussion.

Teacher 4 hints that some of the Internet research that was done for contextualizing the project may have been meaningless (Stevenson, 2007b) when he stated "so we trundle off to the computer room and sits and Google Wikipedia, and put the same guff down without any kind of critical intervention from the teacher" (TI4, l69 - l71). This suggests that the critical interpretation or reflection of the orientation knowledge by the facilitating teacher was not apparent to Teacher 4. And while this is an opinion of one teacher on another's facilitation skills, the lack of critical interpretation is further particularly supported by evidence in LP4, p. 30, where the one piece of referenced contextualising knowledge in the entire project shows evidence of superficial interpretation:

> "Millions of trees are cut down every day to make paper and if you just throw that piece of paper into the dustbin and not recycle it, how many trees will there be in years to come? There won't be any!" (LP4, p. 30).

The skills (or Mason's (1991) procedural knowledge) that were available to the learners show that these learners have been able to access background knowledge from the Internet; however evidence of skills of accessing background knowledge from potential sources identified by the teachers other than the Internet is not apparent. It is possible to argue that the learners could have benefitted by accessing and reflecting on information from a variety of source types – and that the potential to develop learners as critical interpreters as Stevenson (2007b) recommends has been passed over.

It would appear that there is enough evidence of relevant contextualizing knowledge in each of the Learner Projects to suggest that an adequate framework from which to investigate socio-ecological issues was accessed, as Lotz (1999) and Wals and Haymann (2004) note, is important.

In summary then, skills to access contextual knowledge are apparent in all the learners' work, however evidence points to a lack of teacher facilitation to encourage learners to reflect critically on this knowledge.

5.3 Knowledge Creation Through the Project

As part of the research process, learners were required to generate knowledge about the particular area of interest within the community. To this end the learners involved in both the paper and the plastic packet focused projects generated questionnaires to administer to their community members.

> **Analytical Statement 2**
> There is evidence to suggest that knowledge regarding practices within the local community studied was generated through the project.

There is clear evidence to suggest that learners were equipped with skills necessary to gather information about the aspect of the community that they studied, to a greater or lesser degree. As shown in Chapter 4, learners were required to identify what it was they wanted to research, and to align their questionnaire/s in accordance with their desired research.

While the examples given in Section 4.5.4 are straightforward ones, they serve to illustrate that learners were capable of designing a simplistic research tool in order to gain access to new knowledge regarding the community. The examples from LP1 and LP3 show that these groups aligned their questionnaires with their stated intentions, which had been drawn up as a group. With LP4, however, the synthesizing of a common goal for research led to a series of questionnaires being generated that were not specifically aligned to any of the proposed areas of research.

The learners in LP1 gained information over and above that which they specifically set out to do. There data is presented on the basis of age and gender, neither of which were noted in the proposed research. The analysis of this data, however, was done on the basis of age and gender, suggesting that the proposal did not contain the detail of their plan.

There is evidence of potentially conflicting new knowledge that was generated between LP1 and LP2 regarding the use of material versus plastic bags, as noted in Chapter 4. LP1 noted that many townsfolk prefer to use material bags rather than plastic ones, yet LP2 found that more people use plastic bags than material or paper bags. Nowhere is there any indication that these apparently opposing statements were ever used as a discussion point with the classes to enrich the learning experience, in fact evidence is quite emphatic to the contrary – both teachers and learners state categorically that none of the knowledge gained via this project was ever revisited on the project's completion. As noted earlier, Stevenson (2007b) recognizes this as having potential to develop critical interpretation skills, but this opportunity was, once again, missed by the facilitating teachers. The potential to explore within the community why people prefer to use material bags but actually use plastic bags could have been brought to the fore with good facilitation.

There is evidence to suggest that the learners had mastered the skill of representing information in graphical format, although in a few cases the graphs shown were not strictly a true representation of the data (LP1, pp. 23, 26, 29) and a different graph type would have been more appropriate. It is interesting to note that all the graphs were created using Microsoft Excel, and viewed in this light, one could argue that in the case of this misrepresented data, technology was used to "maintain meaningless and low quality learning", rather than "to support a thoughtful and skillful teacher in facilitating authentic and challenging learning" as Stevenson (2007b, p. 276) suggests. However, the interpretation of the data presented within the Learner Projects suggests that learners were able to understand the practices that they had investigated, despite the misrepresentation of the data graphically, thus suggesting a weakness in the creation of meaningful graphs, rather than a weakness in understanding what the data was telling them.

The evidence from the Teacher Interviews shows that it was not always possible for the learners to access the teachers during the allocated time slots – if the learners were not in class at the time of the teacher visit, then they missed out on the opportunity to get help with the aspect of the project relating to that teacher. As the evidence shows, Teacher 3, a Mathematics teacher, felt that they had provided the learners with the mathematics needed to unpack the data that was gathered, the learner projects show that this was not, in fact, always the case.

Considering the fact that the focus of the G9IERP was on the research process within an environmental context, Jickling's (1992) suggestion that educating someone 'for' something narrows the options within

the learning experience. The evidence suggests that it is possible that the focus on the research process was maintained to such a degree by the teachers that the potential to explore the subtle nuances that emerged out of the data from the investigation was overlooked, limiting the potential to explore the values that members of the community place on their practices.

The irony here can also be viewed in light of le Grange's (2004) caution of simply applying curriculum statements as they stand. In a conscious move away from the traditional compartmentalized curriculum contained within the NCS, the move to generating 'interdependent and interaction relationships between teacher and learners who critically engage with information, issues and problems" (le Grange, 2004, p. 139) through the step by step process outlined in Appendix B definitely resulted in the "unintended outcome" (p. 139) of producing interesting and varied data about the local community which could provide a source of extremely rich and stimulating discussion material. However, the opportunity to critically engage with and reflect on the information was precluded due to the focus on the research process itself.

It was noted by all the parties interviewed that the data generated by the project was not utilized after its completion. Thus while knowledge regarding practices within the broader community was generated, critical engagement with this knowledge even within a class in the grade was not done.

5.4 Stated Intentions of Knowledge-Induced Change

Without fail, the learners proposed recycling as a means to improve upon the issue that was studied, and all the proposals appeared to be linked directly to the school environment, even in the cases where the research was done within the context of the broader community.

> **Analytical Statement 3**
> The evidence suggests that the findings of the learners' investigations were constituted at a hypothetical level within the learners' realm of the localized school context (*and comfort zone/'sphere of influence'*).

If one considers LP1 as an example, the issue that was addressed ("Why are the people in Grahamstown not using material re-usable shopping bags? Why should we consider using material re-usable shopping bags instead of plastic bags?" LP1, p. 12), their brief conclusion in their project suggested that one needed to consider alternative sizes and colours of material bags so that there was a wider selection for

the community to choose from in order to decrease the use of plastic packets. However, the proposed solutions in one poster (Pl1LP1FG) “Is this what you want (presented above a picture of a turtle with a piece of plastic in its mouth), Reduce, re-use, recycle. You can help!! (presented over a picture of an assortment of rubbish next to a picture of a flower filled field) Are you eco-friendly??). The poster with the proposed change bears little relation (if any) to the research question, and even less to the conclusions this group drew in their project. The second poster from that group (Pl2LP1) looks at the responsibilities and rights, with no link to the town, or to ‘re-usable shopping bags’ specifically. Other projects are similar in regard to their research focus, the findings of the research and the proposed change.

Where Stevenson (2007a) suggests that the proposed action that emerges from an inquiry process in which the intended outcomes include taking action on real environmental issues needs to be emergent from the local context in which the research took place, the evidence shows that there is a distinct gap between knowledge creation with the community context of the investigation and proposed action within these projects.

To understand the cause of this, one can look to the instructions provided to the learners. On the one hand, the integrated investigation calls for potential recommendations related to the research (Appendix B, l66 - l67), yet the Life Orientation assignment (Appendix F) requires the learners to develop a program within the boarding house, without specifying that it should relate to the findings of the investigation.

It is also possible that while the G9IERP shows a clear integrated approach to teaching, the kind of teaching that has preceded this (i.e. from grade 0 through to grade 9 in these learners’ lives) such as that described by O’Donoghue and Janse van Rensburg (in Peden (2006)) has resulted in learners who are unable to piece together the parts of their own research as they have been taught in isolated, compartmentalized blocks. The link between the two apparently separate assignments was clearly stated within the rubric for the investigation – Appendix C, p. 2 (“recommendations on how to implement findings to improve life have been proposed; assessed with the Life Orientation rubric given”) – but it is apparent when looking at the Life Orientation rubric (Appendix F) that a similar link was not made apparent within this rubric. Thus the removal of the final step in the learners’ projects from the investigative process to the Life Orientation assignment could account for the lack of continuation in the investigation process, providing an example that specific LAs were an obstacle as

Beane (1991) suggested: the real life issue that had been investigated in an integrated way was removed from the context of the investigation by specifically being created within the Life Orientation LA. This is linked to the dominant culture of education that is apparent in our schooling systems – see 3.5.2.3.

There is no evidence to suggest that the learners considered any ideas out of the ordinary or alternate to society's current predominant 'solutions' to these issues, namely reduce, recycle, re-use. Nor is there evidence to suggest that the learners considered what the effects of their solutions could be in the broader picture – i.e. what effects recycling, re-using, reducing would have on the environment or society. To counter this, however, there was no call on the learners to do so.

5.5 Evidence of Continued Transformation

One way to consider if changes have resulted from the G9IERP is to consider the actions that are being carried out a year after completion of the project.

> **Analytical Statement 4**
> Evidence shows that few of the proposed changes were carried into practice, but that levels of interest and concern (i.e. awareness) remain in forefront of learners' consciousness.

Despite the overwhelming evidence which indicates that the data collected through the G9IERP was never specifically referred to or used on completion of the projects, the evidence from the Focus Group data shows that there is continued interest in the topic, not only within the group of learners that constituted the Focus Group, but also within the broader school community. The Teacher Interviews provide similar evidence, with projects on similar topics being voluntarily undertaken, and discussions being entered into between learners and between learners and teachers. While this cannot be directly attributed to the G9IERP as the issues that were investigated are commonly grappled with throughout society, there is evidence to suggest that at least one learner within the grade is making a concerted effort to recycle paper one year after completion of the project, and this change stemmed directly from the investigation that she undertook.

However, the overall evidence suggests that apart from one learner who encourages others to participate in her paper recycling programme, no further sustainable change is evident – in other words, despite the learners accessing knowledge about the negative effect that paper and plastic packet usage

has on the environment, these learners have, for the most part, not changed their practices; Gruenewald and Manteaw's (2007) "gap" is clearly identifiable.

5.6 Follow Through

While reflecting on the lack of implementation of the proposed changes, one needs to consider the opportunities that were afforded for this to happen. While it can be argued that Stevenson's (2007a) recommended learning styles in EE call for active participation and knowledge generation by the learners was met with through the G9IERP, his contention that standard teaching practices across many schools remain teacher focused with passive learners, so it follows that unless opportunities are created for learners to be more proactive, it is unlikely that proposed changes would have the potential to be implemented.

> **Analytical Statement 5**
> There is evidence that the information gathered in these projects was never used formally on completion of the project.

It is clear from both the Teacher Interviews and the Focus Group data that no mention was made of the G9IERP after its completion (for example TI1, l95 – 103; TI2, l74 – l82; TI7, l48 – l55; FG1,l128 – 142). It is clear that once the project was handed in by the learners, it was assessed by the teachers and not referred to again.

While Stevenson (2007a) notes that active participation and knowledge generation by learners is an important component of a learner's education, and it is clear from the evidence presented in Chapter 4 and the discussion above that the G9IERP clearly had active participation and knowledge generation by learners as key ingredients, it is apparent that this project, at the end of the day, remained a teacher focused project, focusing on the theoretical application of research skills and knowledge in what became an artificial scenario. Once learners had handed the project in and the assessment in the rubrics had been done, there was no feedback to the learners or opportunity for the learners to present their findings in a broader community, or to formally implement the proposed changes in a sustainable manner.

It has been recognized by Teacher 7 that one of the original goals of the project was for the learners to produce an article for publication in the local newspaper, or to present the findings that were based on

the school to the staff in the administration and maintenance section. Neither of these was done. As a consequence, the project with much potential became another example to be added to Gonzalez-Gaudiano's (2007) findings, despite having as one of its inherent goals the aim of responding actively to complex challenges of the real world it failed to produce citizens able to make these responses or provide them with the opportunity in which to do so.

There is clear evidence to show that the body of environmental knowledge was generated along the lines le Grange (2004) suggested – through "independent and interactive relationships between teacher and learners who engage critically with information, issues and problems" (p. 139) – which contributed to the exponential growth of knowledge in and about the world as noted by Orr (2004). There is also evidence to show that the "unintended outcomes" that arose (as le Grange suggested could happen) were in line with the apathetic ones identified by Orr – without some form of pre-empting, change did not happen. The G9IERP resulted in the investigation into real world scenarios becoming nothing more than a theoretical application of skills and knowledge as Stevenson (2007a) contends.

The potential to use the knowledge created by the G9IERP in various LAs as a source on which to draw was identified by every teacher interviewed, and all felt that the project had fallen short of its potential as it was not used further. However, as noted in TI4, when he made a passing reference to the project, he got the impression that the learners had "subject fizzle" (l118), suggesting that even if the project had been used in different ways, it may have been counter-productive to the learning experience.

5.7 A Field of Contradictions

5.7.1 The Dual Intent of the G9IERP

As one can clearly see in the outline of the project given to the learners (Appendix B), the intended purpose of the G9IERP was to stimulate knowledge-based change in practices through research. The investigation process provided learners with the opportunity to develop skills within the research field, at the same time providing them with the opportunity to develop their moral and ethical ideas regarding the usage of materials such as paper and plastic packets, and to provide recommendations on how one could implement findings to 'improve life'. Thus the intention was twofold: to create an opportunity to undertake research and to create an opportunity for learners to implement solutions to environmental problems. As Stevenson (2007a and 2007b) suggests, these dual intentions are difficult to marry.

5.7.2 Academic versus Practical

It is apparent from the evidence presented that the proposed recommendations showed little bearing to the investigations that had been done, they were generated in isolation of the project, and it is possible that they were proposed as 'the right answer' rather than as practical solutions, a concept explored by Ewert and Galloway (2009). In other words it became a scholastic performance, driven by assessment criteria. When one considers the framework within which the project took place, it is clear that the school is driven by a culture of academic achievement – and this is based entirely upon marks, and in order to formally achieve academic recognition, a minimum achievement of 75% for Life Orientation is required. The idea of proposing changes to 'improve life' outside of a rubric driven assessment would appear meaningless within this cultural economy of marks, thus an axis of tension can be identified within these proposed solutions – learners' proposed solutions about a problem (academic), rather than solutions pertaining to the problem (practical).

5.7.3 A Dual Mandate

In considering the aims of the overall project, solutions in regard to the learners' investigations within the study-context were called for. However, when looking to the aims of the Life Orientation aspect of the project (the section in which the proposed solutions were assessed), the requirement was to implement a change within the local school environment specifically, and not specifically within the context of the research that was undertaken. Thus a proposal to change based on prior knowledge and a common, socially accepted solution of recycling may appear to a Grade 9 as 'the right answer', and a way to ensure that this minimum requirement of 75% for Life Orientation is achieved. This goes directly against Stevenson's (2007a) suggestion that action needs to be emergent from the local context within which the research took place, and provides a perfect example of a hidden agenda – where a powerful entity (namely the rubric) dictates how citizens (in this case the learners) should behave (produce an answer that will achieve marks, not a solution that will solve problems).

The irony that can be seen here is that in removing the focus of the work done by the Grade 9s away from the precise curriculum, the over-specification of the research outcomes led the learners to ignore the issue of the knowledge altogether and prohibited learners from moving into areas of new understanding, in much the way the Allais (2007) argued could happen.

5.7.4 The Demographics

One can also consider the larger group dynamic when considering the failure to implement changes within the local environment which had underlying knowledge (ie local change in the local environment). Gruenewald and Manteaw (2007) suggest that solutions that have the potential to be successfully implemented should involve democratic participation. When one looks at the proposed solutions (and to a large degree these focused on recycling), there is no indication that these were democratically decided upon by the community into which they were expected to be implemented – one class of Grade 9s (approximately 30 learners) proposed these as solutions to be implemented in a school community of 350 learners.

5.7.5 Superficial Knowledge will not Develop a Moral Code

Short (2010) notes that without sound, well researched causal effects underlying environmental issues, there can be no responsible action taken and no improvement in the quality of the environment can be expected, so one needs to be cautious that one does not teach content and knowledge without equipping learners to be able to deal effectively with that knowledge. This concept is concurred with by Stevenson (2007a and 2007b), who suggests that the knowledge component lends itself to the school environment, but developing a moral code which would enable learners to develop their capacity to act requires an in-depth investigation into the political, social and economic concerns regarding the issue at hand.

I would advocate that the evidence presented through the learners' projects and proposed changes suggests that the depth of research was insufficient to enable sustainability issues to be addressed through change initiatives. The true causal effects underlying the environmental issues investigated by the learners were possibly not fully researched, adding to the predominance of recycling as the proposed solutions. To use the projects on plastic packets to illustrate my point, the evidence in Chapter 3 (regarding the learners' contextualizing knowledge), suggests that the learners were aware of many of the superficial facts regarding plastic packets:

- oil is used in the creation of plastic packets,
- how many plastic bags were produced and used in the world,
- the costs involved in recycling were more than the costs involved in producing new plastic packets,

- how many plastic bags the local shop sold in a day,
- why consumers in South Africa pay for plastic packets,
- how long it takes for plastic packets to bio-degrade,
- plastic packets create untold harm in the environment, specifically they end up in the oceans and strangle many animals.

There was no indication to suggest that any of these ideas were investigated in any great depth – for example, why does using oil in the creation of plastic packets pose a problem, how do plastic packets get from source to shop and what effect does this have on the environment, or from user to recycler back to the shop, what are the side-effects or by-products of recycling plastic packets? The learners did not consider that by recycling plastic packets one simply removes the first step in the production process, and adds other risks in terms of toxins produced and transportation issues. The predominant solution was to recycle or re-use plastic packets. Only one of the four posters that I researched suggested that one should 'say no to plastic bags', but with no explanation as to why this was a solution.

Taking a step back to consider the brief solutions that were proposed within the project itself (in other words not the solutions proposed within the Life Orientation class), there is evidence to suggest similar superficial responses, although LP1 suggested that material bags are an appropriate alternative to plastic packets. However there is no research to indicate why they are better, or clarity to support what is meant by 'material'. The potential consequences of using a polyester-based cloth in the bag, which is, in itself, based on an oil byproduct, have not even been mentioned or explored, nor has the idea that these are heavier and bulkier than plastic packets, and therefore transport (and therefore environmental) costs have to be considered.

Thus the superficial examination of the plastic packet issue in this light would perhaps suggest to learners that a viable solution would be to recycle or re-use plastic packets (or material bags), thereby reducing the demand and production of plastic packets and oil-based products, but without considering what the effect of doing so may be. A similar argument can be construed with the paper recycling argument. This suggests that there is a lack of depth to the research which prohibits the development of a moral code to look for alternative solutions and radical changes in practice.

5.7.8 A Little Revolution

The evidence shows that there is little continued change in practice arising from the learners' involvement with the G9IERP. Despite calling for recycling and re-using, there is little evidence to show that this is happening on an on-going basis within the school environment, which was the community within which these sustainability changes were implemented.

However, one learner continually acts out her solution of recycling paper a year down the line. Another learner suggests that she carries plastic packets to reuse when she remembers to do so. The evidence shows that there is an underlying interest in these environmental issues continuing at the schools. As Todd (2005) explains, changes within an institution are often slow to occur, as the identity of the institution itself has to change based on a gradual response to disruptions of cognitive categories, resulting in cultural unease, leading to implementation of new practices as old ones fade away. In other words, according to Todd, one cannot expect radical shifts in practices to occur overnight, although it is possible that such changes can occur if the culture of the institution reaches a threshold point, and the population (as it were) can realize the value of the change. She notes, in a vein similar to Gruenewald and Manteaw (2007) that it is possible that imposed changes can fail due to older habits being transposed upon the new ideals.

5.8 Conclusion

The analysis of the evidence presented in this Chapter indicates that the G9IERP as it stood in 2009 provided learners with some wonderful opportunities to learn and practice skills, and to synthesise old and new knowledge. It is clear from the literature that the problems of minimal change occurring based on this knowledge are not unique to the G9IERP, and have been encountered, identified, and pondered upon in the world-wide arena of environmental education. The analysis has allowed for an identification of some of the issues that have led to the hindering of change, and these can be noted as contradictions and tensions within the G9IERP.

The research findings indicate that there are a large number of contradictions emerging from the evidence presented in Chapter 4. These contradictions appear to be stumbling blocks for the potential for knowledge-based sustainable change to occur; learners are persuaded more by the assessment rubrics than by a moral code, indicating that the power held by the teacher and the assessment outcomes are curtailing the potential for learners to consider change based on their research

knowledge. In light of this, the largest stumbling block is the contradiction between the intended outcomes of the project as it was implemented over the three day period set aside for it, and the specific requirements set out in the Life Orientation project which ran concurrently, providing the platform for knowledge-induced sustainability change to be developed. The evidence suggests that if these two intended outcomes had been the same, the proposed changes may have been radically different to those that were given, and it is possible that the changes may have been more effectively implemented with greater success.

The concluding Chapter considers the final key question of this study – what measures could be taken to help improve the project in the future? Drawing on the literature, the evidence and my own personal experience of facilitation of the project, a tentative proposal has been mooted in Chapter 6 as a way forward in this regard.

6. Where to from here?

6.1 Introduction and Chapter Overview

In Chapter 5 I looked at what could be said about knowledge, skills and change in relation to the Grade 9 Integrated Environmental Research Project (G9IERP). In Chapter 6, I reflect on the research question and aims of the study, summarizing the key research steps, the findings and make recommendations based on the analytical statements presented in Chapter 5.

It is clear for the complexities surrounding the development of such an integrated project within the context of the two schools functioning together that there will be no definitive recommendations that can hope to solve all the contradictions and tensions that have been raised through this research. However, the suggestions contained within this Chapter may allow some of these contradictions to be reduced, and some of the tensions to be released to make for an improved implementation of such a project in the future.

Following on the recommendations for the G9IERP, I conclude the chapter with a reflexive review of my own research process and consider what could be done to follow on from this research.

6.2 Summary of Research Findings in Light of the Research Question

The research question that was posed in Chapter 1 read: "can engaging learners in research around an environmental issue within a local context lead to knowledge-induced sustainability change?"

It would appear from the evidence that the G9IERP enabled learners to engage with prior knowledge and new knowledge through the development of their research skills. While there is an indication that this engagement with the knowledge was as the teachers anticipated it would be, it was limited predominantly to Internet research. The contradictory knowledge that emerged during the course of the G9IERP could have been better facilitated by the teachers in charge, but despite this not being done, the opportunity for social learning to happen created opportunities for learners to rethink their own views on the environmental issue that they were studying.

The largest contradiction of a dual mandate to the learners could be largely responsible for the weak suggestions regarding change based on the knowledge gained. Of the two different instructions, the one based in Life Orientation clearly had greater 'power' as learners within the school are driven by their

assessment, and the assessment of the proposed change was to occur in the Life Orientation assignment. It is apparent from the lack of proposed changes relating directly the research that they undertook that learners are more concerned with the hidden agendas of rubrics and marks than they are with the change based on knowledge. At this point one has to stop to consider Orr's (2004) contention that the focus on "… theories, not values, … neat answers instead of questions; and technical efficiency over conscience … [is] no guarantee of decency, prudence or wisdom" (p8).

However, despite the tensions that the evidence shows existed in the G9IERP, it also indicates that one learner continues to implement the change in practice which she proposed a year after its implementation, and another tries to remember to re-use the plastic packets during her shopping expeditions. This strongly suggests that the social learning process does, in fact, allow learners the "opportunity to confront their core values, their practices and their entrenched lifestyles" (Wals and Heyman, 2004, p. 23) and that change based on knowledge is a potentially viable objective.

6.3 Recommendations for the Future Planning and Implementation the G9IERP

The potential for the G9IERP to act as a vehicle for developing research is clear in the evidence presented in this thesis. However, in order to ensure that the G9IERP has a greater potential for knowledge-based sustainability change, the major contradiction of the dual mandate has to be rectified and the large number of smaller tensions and contradictions need to be considered.

The intention of my own research has never been to dictate what would be work or what new methods should be implemented, but rather to unearth these contradictions and tensions to aid a better understanding of the process as a whole with a view to improve it.

In light of this it would make sense to suggest that the developers of the project have access to the findings of this research so that my colleagues and I can work together to iron out the tensions and rectify the contradictions.

Apart from the dual mandate, another core issue that need to be considered by the developers in light of this research is the validity of the assessment attached to the G9IERP, and how one is able (or unable) to assess the development of a moral code. As soon as rubrics and marks are associated with any kind of outcome, in this case sustainability change, the likelihood of hidden agendas comes to the fore and learners are more likely to be swayed by the 'right' answer for their own achievements rather than the

good of society as a whole. Thus careful consideration needs to be given to which part of the G9IERP warrants assessment, and how can sustainability change be better supported for its successful implementation into the broader community. Considered in light of Orr's quote above, perhaps a key question to consider is: what is the ultimate purpose of such a research project?

While it may be that the ultimate goal of the G9IERP was an ambitious one – to stimulate change based on knowledge – Walker (2005) suggests that in order to develop capabilities, one should continue to scrutinize the practices within education in order to improve on them. She uses a quote from Sen (2002) to put her point across:

> "The question of the openness of curriculum and the reach of reason can be quite central to the role in promoting human security. If the schools fail to do that by 'thrusting smallness' on children, we not only reduce their basic human right to learn widely, but also make the world much more incendiary than it need be." (p. 109)

The evidence in this study and the suggestions from the broader literature suggest that the G9IERP has a great potential to develop as a process of social learning that induces meaningful change, but one needs to be careful that one does not 'thrust smallness' onto the learners and limit them through assessment criteria if the ultimate goal of the project is to induce co-engaged social learning that is centred on knowledge-based change – i.e. aid in the development of values and responsible citizenship.

To this end I would recommend that a workshop be held, where we as developers of the programme are able to work together to socially deconstruct the evidence presented in order to reconstruct it in a more productive and meaningful manner. Based on the research contained in this thesis, and incorporating some of the ideas presented in the literature, it may be possible to further build on the positive aspects that were clearly visible within this project, and be more effective in producing learners who are more informed and willing to effect change together based on acquired knowledge and experience of environment and sustainability concerns in their context.

A potential starting point for this workshop could be a reflection on Jickling's (2003) tentative guideposts when dealing with issues that are open-ended with no 'right' answer, as was the intention of the G9IERP, namely: embrace ambiguity; build in indeterminacy; be fair; be a citizen too; select issues carefully; value controversy; and be courageous (p. 25). Jickling's ideas considered in conjunction with

the contradictions and tensions that have been recognized through this study could lead to an interesting and stimulating discussion around the development of G9IERP for the future.

6.4 Reflexive Review of the Research Process

While I would not consider this research process to be seriously flawed as a knowledge-generating review of the project curriculum and process, there are a number of changes I would make if I were to carry out similar research again.

The main change I would make would be to build in time to undertake follow up interviews with the teachers. One of the reasons underlying this recommendation I have noted in the study – namely that my interview skills improved with practice; another reason for this is that it would have been useful to further probe for evidence on some of the decisions and actions that were undertaken by learners and/or teachers during the implementation of the G9IERP in order to gain a deeper understanding of the project. However, being pressurized for time, I was unable to change the process and undertake follow up interviews, but feel certain that new insights will be part of the planned follow-up with the outcomes of this research review of the project.

I would like to have transcribed the learner projects into digital form, as it would have been far easier for me to code them this way. I feel that the evidence of these data could have been chosen more thoroughly; this limitation is partly due to time constraints, but mainly due to the fact that my skills are better developed in dealing with digital data than in hardcopy form. I found myself returning to the learner projects time and time again, and feel that I could have been far more efficient had I had access to these data in digital format.

6.5 Potential for Further Research

I have touched on many of the complex issues in this thesis very simply, and believe that is room for greater analysis on some of these issues, such as Bourdieu's idea of the symbolic power that the school as an institution may hold over the learners within it, or to consider the data in light of Bhaskar's ideas on the dialectic pulse of freedom.

Considering the wider questions on knowledge and change that these perspectives give rise to, I think that most valuable would be to consider the further round of implementation, to see if by reflecting on the evidence in this initial review the G9IERP is better able to meet its aim of stimulating sustainable

change based on researched knowledge. By continuing work in this way, perhaps 'the gap' between knowledge and practice could continue to close, and learners would be better equipped to problem-solve towards more sustainable ways of living and working together in the world.

Appendix A – Overview of the research process – teacher guide

Grade nine project – research process that we would like to have covered in class before the first Wednesday . I have no doubt that everyone has a solid grasp on research processes so I don't mean to offend anyone by suggesting the specific outline below – it was put forward be Mellony and we feel that if all the learners are following roughly the same procedure with their teachers then it will be easier to manage the whole process.

So when teaching the "research process" – and I think I will produce a document for everyone – meaning that it will be in the learners set of instructions etc as well (but they will only get it later - on first Wednesday):

1) **Stating a problem** – what is the issue to be addressed? Why is the research of interest to anyone – ie why is this research important – what CONTEXT in a broader sense/bigger picture does it fit into – this is the area that some background research is always of use.
2) **Aim of the research** – what is it that you want to find out and why – which will easily lead on to the next one which is
3) **Stating the specific research question/s** – this is where you identify the exact questions that will be answered in your research.
4) **Research plan and methods** – What needs to be found out in order to answer the question/s and how will the information be obtained. One needs to spend some time here because this is the area that people will have to set up their actual research design and one must spend some time looking at different types of information and different ways that this information can be accessed
5) **Ethics of research and respectful behaviour** – we need to address this – some of this will be included in what they have to do as part of the process BUT they need to understand and be taught from the outset that you need permission from people to undertake interviews, or to go into a boarding house and take readings and so on.
6) **The actual doing of the research** – ie the empirical field work – again this will be different depending on what and how the work is being undertaken (cant think of the correct grammar there…). But some teaching around the gathering of data needs to happen.
7) **Presentation of results** – this is about making the results available to readers in easy to read format – tables – graphs – pictures and so on. Easy to discuss I think
8) **Analysis of results** – this is the bit that learners often leave out – what does the information they have gathered mean ? In particular they need to be aware of the fact that this should be relating back to the original questions – am I answering my question – how – if not – why etc – I would call this not only the analysis of results but also an interrogation of the validity of the data and the refinement of the research process. Because they must understand that once you have understood your results you can loop right back to the beginning again and say – did I ask the right question – is there a better one etc…..
9) **Recommendations** – must have these in relation both to actions to be taken on the ground and also wrt the research process.

Appendix B – Overview of the research process – learner guide

GRADE NINE
INTEGRATED RESEARCH PROJECT

Basic research outline:

When undertaking research you will, with changes to some of the details, follow a research process like the one you have been taught in class that is outlined below.

1) **Identifying and stating a problem** – what is the **issue** to be addressed? Why is the research of interest to anyone – in other words **why is this research important**. What **CONTEXT** in a broader sense/bigger picture does the research fit into – this is the area that some background research is always of use. To do this you would find out if previous research has been done by anyone, what that research has found and so on. This is normally called a "literature review" – because we read already written material to find out what has been done on our topic. (referencing critical here)
2) **Aim of the research** – here you would state clearly what is it that you want to find out and why. Once you know this it should be easy to state a very specific research question.
3) **Stating the specific research question/s** – this is where you identify the exact question/s that you will try to answer in your research. Please note that the more specific and focussed your question is the easier it will be for you to proceed with your research. Normally the question is about a small part of the problem area of research that you identified in number one.
4) **Research design and data gathering methods** –
    a. **WHAT** needs to be found out in order to answer the question/s. Here you need to be very specific about the information that you need to get to answer your question. The clearer you are here the easier it will be to establish
    b. **WHERE or WHO** you will be able to get your information from and
    c. **HOW** the information will be obtained. Here you will need to be clear about your methods – will you undertake surveys? Interviews? Will you measure something? The HOW of information gathering is mostly dependant on and very closely linked to the who and what of your information. You should also include time scales in this.
    d. Every researcher must take great care that their research is conducted in and ethical and respectful manner. Each situation will require a different approach but overall you must have permission, from people involved in or linked to your research, to undertake the research. This must be considered when establishing your research plan.
5) **The actual doing of the research** – ie the field work. This will be different depending on your research plan and methods. Once you have decided on how to gather your data and you are set to go you can go into the field and begin to gather your data. If you encounter problems with your data gathering you must go back to your Research design and data gathering

methods and figure out how you can change that to ensure smooth data gathering.

6) **Presentation of results** – this is about making the information that you have gathered available to readers in easy to read format – tables – graphs – pictures and so on. This is really where you **summarise** the information that you have found.
7) **Analysis of results** – this is the bit that people often forget about.
    a. Once you have summarised your information you need to tell people what the information you have gathered means. This does **not** mean that you describe what the graph or table is showing. What it means is that you **explain how the information on the graph helps you to answer your question.** If your information gives you really weird answers – or does not help you answer your question – or gives you results that you find strange – you need to tell the reader this AND you need to try to work out **why** your information is doing this. This means that you will be both analysing your data but also an interrogating the validity of the data and through this you will be refining your research process.
8) **Conclusion and recommendations** – this is exactly what this is – you conclude – did you answer your question ?, what have you established through this research ? You also need to make recommendations in the two categories as set out below.
    a. **Recommendations** about the research itself. If you were to start again how would you improve the research; what would you do differently, is the question worth asking – if not – what should you be asking and so on.
    b. **Recommendations** about what you have found out – ie. How can you implement your research findings to improve the world around you !
9) **Referencing:** Please note that you MUST reference both in text and at the end of text. In order to do this easily you should note down every source that you use ass you are using it – then you will have no difficulty when writing everything up. You will find step by step detailed information on how to reference on the homepage of the intranet: go to EITHER
    a. Documents - the third item on the drop down menu is referencing – OR
    b. Academic – libraries then referencing.

    Taking time to keep the paper trail will make your referencing simple and efficient –and it will mean that you do not get penalised for not referencing. **If you are unsure ask your teacher or the librarian.** The more you do this the easier it becomes.

Research topics:

1. 9T - Power and water usage in the houses
2. 9K - Paper usage at school
3. 9G - Drinking water source - staff; pupils etc and the environmental impact of bottled water.
4. 9N – Grahamstown water quality
5. 9J - Recycling plastic bags - purchasing plastic bags, use of non plastic shopping bags.

Task to be completed and brought to class on Wednesday 3 June:

Write a one page research proposal in which you outline how you will deal with steps 1 to 4 of the research outline as described above.

Appendix C – Rubric for assessment of research

GRADE NINE INTEGRATED RESEARCH PROJECT – ASSESSMENT RUBRIC

RATING CODE	1- Not Achieved	2- Elementary	3- Moderate	4- Adequate	5- Substantial	6- Meritorious	7- Outstanding
	0-2	3	4	5	6	7	8+
INTRODUCTION (1,2 and 3 of research process) a) The issue, the context and the aim of the research are identified. b) the specific research question is stated.							
	0-2	3	4	5	6	7	8+
RESEARCH METHODS (4,a,b,c and d of research process) The what, where, who and how of data gathering has been stated.							
	0-4	5-6	7-8	9-11	12-14	15	16+
PRESENTATION OF RESULTS (6 of the research process) Appropriate methods have been used to summarily communicate the findings.							

	0-4	5-6	7-8	9-11	12-14	15	16+
ANALYSIS OF RESULTS (7 of research process) Information presented is discussed and explained **in relation to the question asked.**							
	0-4	5-6	7-8	9-11	12-14	15	16+
CONCLUSION AND RECOMMENDATIONS (8 of research process) a) the research is concluded in relation to the questions posed and answers found b) Recommendations re: how to undertake the work differently if started again have been considered c) recommendations on how to implement findings to improve life have been proposed.	Assessed with the Life Orientation rubric given.						

REFLECTION IN FAL OUT OF 15	SEE ATTACHED RUBRIC						
	0-2	3	4	5	6	7	8+
REFERENCING a) has been undertaken **in text** as per intranet page b) has been undertaken **end of text** as per intranet page.							
TOTAL / 105							
REFERENCING HAS NOT BEEN UNDERTAKEN AT ALL	**LEARNER CANNOT BE AWARDED ANY MARKS AS A RESULT OF PLAGIARISM.**						
GENERAL COMMENT:							

Appendix D – Guideline for submission

Grade Nine Integrated research project – project structure instructions

Please take note that this is the last part of the process that will be put into your Flip files.

Introduction: This must contain parts 1,2 and 3 of the research process document.

Research methods: this must contain part 4 of the research process

Presentation of results: this is number 6 of the research process. Please note that you must use the form of presentation that is appropriate to your data.

Analysis of results: this is number 7 of your research process

Conclusion and recommendations: this is number 8 of your research process. Please note that the recommendations re divided into 2 sections:

a) will deal specifically what you recommend re: the research process (eg ask the questions differently and so on)
b) will be the work that you have been set for Life orientation – ie your group's recommendation for a programme and your personal poster.

Reflection: Each individual must do a reflection of what they learnt/enjoyed/didn't enjoy in this process **in their first additional language. This should be 150 to 200 words long.**

Referencing: Each project MUST have complete in text referencing as well as a list of references used at the end of the text.

Appendix E – Rubric for assessment of First Additional Language

Gr 9 Research Project – Reflection rubric

	5/4	3	2/1/0
Content:	Excellent content – sharing of personal experience.	Content - average	Very little to no effort.
Grammar:	Vocabulary, sentence structure and idiomatic language excellent	Good vocabulary and sentence structure.	Too many mistakes / use of English words.
Reflection:	Learner identifies mistakes and successes and discuss in hind sight. Suggestions of corrections.	A few mistakes and successes are mentioned but very little discussion.	Little or no insight in process.
Total: /15			

	5/4	**3**	**2/1/0**
Inhoud:	Die inhoud is uitstekend - goeie beskrywing van persoonlike ervaring	Die inhoud is gemiddeld	Baie min of geen poging aangewend nie.
Taalstrukture:	Woordeskat, sinskontruksie en idiomatiese taalgebruik uitstekend.	Goeie woordeskat en sinskonstruksie	Te veel foute en Engelse woorde.
Refleksie:	Leerder assesseer eie foute en suksesse en kan terugskouend daarop kommentaar lewer. Voorstelle vir verbetering.	Leerder noem ‘n paar foute en suksesse maar bespreek dit nie in diepte.	Baie min of geen terugskouing nie.
Totaal: /15			

Appendix F – Life Orientation poster and solution implementation handout

LIFE ORIENTATION

"Going Green"

Grade 9

Learning Outcomes 1: Health Promotion
Assessment Standard 2: Develops and implements an environmental health programme
Learning Outcome 2: Social Development
Assessment Standard 1: Debates issues with regards to citizens' rights and personal choices

Environment

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

According to the group to which you have been allocated, complete the following task(s):
Group 1 (Power and water usage)
Grade 9T [Mr Hobson]

i) Develop a programme in your boarding house (hostel) whereby the House can monitor and assess the amount of water being used each month.
Implement ways of conserving water in the House.

ii) Design a poster appropriate to your topic showing your rights to having both power and water as citizens

Websites worth visiting:
www.yellowpages.co.za
www.mybroadband.co.za
www.se-so-tec.com
www.scarborough.org.za
www.prasa.co.za
www.ru.ac.za/Environment/Action/Recycle
www.defza.com/notes/South-africa/recycle-reuse-sa-za
www.translationdirectory.com/glossaries/glossary027.htm
www.envision.ca/templates/profile.asp
www.wordnet.prineton.edu/perl/webwn

LIFE ORIENTATION
"Going Green"

Grade 9
Learning Outcomes 1: Health Promotion
Assessment Standard 2: Develops and implements an environmental health programme
Learning Outcome 2: Social Development
Assessment Standard 1: Debates issues with regards to citizens' rights and personal choices

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

According to the group to which you have been allocated, complete the following task(s):
Group 2 (Paper Usage at school)
Grade 9K [Mrs Preston]

i) Develop a programme in your boarding house (hostel) whereby the House develops a programme for conserving and saving on paper and the collection of 'waste' paper for recycling purposes.
Allocate a person in each House to collect waste as well from the printing departments and other areas of the school.
ii) Using 24(b) above, design a poster to illustrate your right in this particular area and explain in your poster how important it is to save paper and thereby, save the environment

Websites worth visiting:
www.yellowpages.co.za
www.mybroadband.co.za
www.se-so-tec.com
www.scarborough.org.za
www.prasa.co.za
www.ru.ac.za/Environment/Action/Recycle
www.defza.com/notes/South-africa/recycle-reuse-sa-za
www.translationdirectory.com/glossaries/glossary027.htm
www.envision.ca/templates/profile.asp
www.wordnet.prineton.edu/perl/webwn

LIFE ORIENTATION

"Going Green"

Grade 9

Learning Outcomes 1: Health Promotion
Assessment Standard 2: Develops and implements an environmental health programme
Learning Outcome 2: Social Development
Assessment Standard 1: Debates issues with regards to citizens' rights and personal choices

Environment

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

According to the group to which you have been allocated, complete the following task(s):
Group 4 (Drinking water source)
Grade 9G [Mrs Griffith-Smith]

i) Develop a programme which could be used in your House whereby all pupils could gain access to 'pure' water in the House for the purpose of human consumption. Your programme should be as 'cost-free' as possible so that mere purchasing of water does not become the only possibility. What possibilities exist in Grahamstown? What would the environmental impact be on bottled / bottling water?
ii) Create a poster illustrating your rights to 'safe' water for human consumption.

Websites worth visiting:
www.yellowpages.co.za
www.mybroadband.co.za
www.se-so-tec.com
www.scarborough.org.za
www.prasa.co.za
www.ru.ac.za/Environment/Action/Recycle
www.defza.com/notes/South-africa/recycle-reuse-sa-za
www.translationdirectory.com/glossaries/glossary027.htm
www.envision.ca/templates/profile.asp
www.wordnet.prineton.edu/perl/webwn

LIFE ORIENTATION

"Going Green"

Grade 9

Learning Outcomes 1: Health Promotion
Assessment Standard 2: Develops and implements an environmental health programme
Learning Outcome 2: Social Development
Assessment Standard 1: Debates issues with regards to citizens' rights and personal choices

Environment

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

According to the group to which you have been allocated, complete the following task(s):
Group 5 (GHT water source)
Grade 9N [Mrs G-Smith]

i) Develop a programme showing how we could find out on a twice annual basis that the water we receive in our homes and boarding houses here in Grahamstown is pure and safe to use in our homes. The processing of municipal water would have to be investigated.
ii) Create a poster illustrating your rights to 'safe' water for human consumption.

Websites worth visiting:
www.yellowpages.co.za
www.mybroadband.co.za
www.se-so-tec.com
www.scarborough.org.za
www.prasa.co.za
www.ru.ac.za/Environment/Action/Recycle
www.defza.com/notes/South-africa/recycle-reuse-sa-za
www.translationdirectory.com/glossaries/glossary027.htm
www.envision.ca/templates/profile.asp
www.wordnet.prineton.edu/perl/webwn

LIFE ORIENTATION
"Going Green"

Grade 9

Learning Outcomes 1: Health Promotion
Assessment Standard 2: Develops and implements an environmental health programme
Learning Outcome 2: Social Development
Assessment Standard 1: Debates issues with regards to citizens' rights and personal choices

Environment

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

According to the group to which you have been allocated, complete the following task(s):
Group 6 (Recycling plastic bags)
Grade 9J [Mrs Preston]

i) Develop a programme whereby you collect and save plastic bags within your House and the school for the direct purpose of recycling.
   What alternatives could be used in place of plastic?
ii) Design a poster to show your rights to a healthy environment without the dangers of plastics spoiling the environment.

Websites worth visiting:
www.yellowpages.co.za
www.mybroadband.co.za
www.se-so-tec.com
www.scarborough.org.za
www.prasa.co.za
www.ru.ac.za/Environment/Action/Recycle
www.defza.com/notes/South-africa/recycle-reuse-sa-za
www.translationdirectory.com/glossaries/glossary027.htm
www.envision.ca/templates/profile.asp
www.wordnet.prineton.edu/perl/webwn

Grade 9 'Going Green' Marking Tool
Grade 9J

Name: _____

Grade 9		
Programme		
Effectively linked to ASs & Environmental Rights		10
Maintained and managed over 30 day period		20
Evidence of conclusion and summary of results		10
Evidence of websites being used and referenced		10
Total:		50
Poster		
Effectively linked to your rights as given in 'The Environment' #24		10
Poster shows clarity of focus and originality on given topic		20
Aesthetically pleasing		10
Total:		40
+ evidence of timeous completion and effort of both programme and poster Total:		10 100

Comment:
_____
_____
_____
_____

Signed: _____

Date: / /

Appendix G – Letter to the Heads

27 September 2009

The Principal

Dear

Request for Permission to undertake research at [your school]

As you are aware I am currently reading for my Masters Degree in Environmental Education at Rhodes University. I would be most grateful if you would allow me to use the Grade 9 Integrated Environmental Research Project at [your school] as the focus of my research.

The aim of my research would be to investigate how effectively this project covers the Grade 9 environmental outcomes as laid down in the Revised National Curriculum Statements, as well as the Critical Outcomes that teachers involved in the project anticipated it would cover. The ultimate goal of this project is to evaluate the quality of the work done in this project and report the findings in a half-thesis, which will be made available to the school. It is envisaged that this report would be open to perusal by the staff members that are interested in the findings to aid in improving the project.

It is my intention to get express permission from the individual teachers that I would like to interview in this regard, as well as from the learners that I would like to administer a questionnaire to. I would be more than willing to submit copies of the interview schedule and questionnaire for your perusal beforehand. The teachers' and learners' anonymity is assured in the final thesis, as is the school's.

If at any time you should feel uncomfortable with the research process, I would welcome the opportunity to communicate regarding this. However, as the Principal of [your school], you would have the right to withdraw the school from this research at anytime, for any reason.

Should you have any concerns or questions in this regard, please do not hesitate to contact me. My email address is xxx and my cell number is xxx.

I would appreciate it if you could sign the attached letter of consent for my files.

Yours sincerely

Sue Webber

Consent Form

I hereby agree to allow the Grade 9 Integrated Environmental Research Project at my school to be the object of Susan Webber's Masters in Environmental Education research. I understand that she will be interviewing a number of teachers and administering a questionnaire to Grade 9 learners, subject to my approval. The confidentiality and anonymity of the involved participants will be assured. The results of the research will be made known to the school principal.

Signed:

Appendix H – Letter to teachers

April 2010

Dear

Request for Permission to undertake research on the Grade 9 Project

As you are aware I am currently reading for my Masters Degree in Environmental Education at Rhodes University. I would be most grateful if you would agree take part in an interview regarding your views on the Grade 9 Integrated Environmental Project that you helped design in 2009.

The aim of my research would be to investigate how effectively this project covers the Grade 9 environmental outcomes as laid down in the Revised National Curriculum Statements, as well as the Critical Outcomes that teachers involved in the project anticipated it would cover. The ultimate goal of this project is to evaluate the quality of the work done in this project and report the findings in a half-thesis, which will be made available to the school. It is envisaged that this report would be open to perusal by the staff members that are interested in the findings to aid in improving the project.

As this project was developed by yourselves, I would appreciate your support in this regard. While I would like to assure you that I will take the utmost care to protect your identities in the writing of my thesis, I am sure that you are aware that anyone at either of the schools will be able to identify yourselves as the developers of this project. In this regard, I would like to reiterate that the purpose of the project is one of evaluation with 'good intent', and not one in which you would be put in a position to need to defend yourselves.

Should you have any concerns or questions in this regard, please do not hesitate to contact me. My email address is xxx, and my cell number is xxx.

I would appreciate it if you could sign the attached letter of consent for my files.

Yours sincerely

Sue Webber

Consent Form

I hereby agree to allow the Grade 9 Integrated Environmental Research Project that I was integral to developing to be the object of Susan Webber's Masters in Environmental Education research. I understand that she will assure my anonymity within her thesis, although she might not be able to do so at a local level. The results of the research will be made known to the school principals and developers of the project. I have the right to withdraw from this research at any time.

Signed: _____ Date: _____

Appendix I – Learners letter of consent

Dear Grade 9's

I am currently undertaking my own research into the Grade 9 Integrated Environmental Research project that you undertook earlier in the year.

The aim of my research is to investigate how effectively this project covers the Grade 9 environmental outcomes as laid down in the Revised National Curriculum Statements, as well as the Critical Outcomes that teachers involved in the project anticipated it would cover. The ultimate goal of my research is to evaluate the quality of the work done in this project and report the findings in a half-thesis.

The purpose of this questionnaire is to gain insight into your experience of the Grade 9 Integrated Environmental Project that you did earlier in the year. It would be appreciated if you could answer these questions as honestly and as accurately as possible in order that I might ascertain exactly how you experienced the project.

To this end I would appreciate it if you could give your express permission to be involved in this research by signing the declaration below. Your anonymity will be guaranteed, as no names appear on the questionnaire. You have the right to withdraw at any point in time, in which case you would need to identify your questionnaire to remove from the study.

Many thanks

S. M Webber

Consent Form

I hereby agree to participate in research around the Grade 9 Integrated Environmental Research Project that I was part of earlier this year. I understand that my identity will be protected, and the results of the research will be made known to the school principals and developers of the project. I retain the right to withdraw from this research at any time.

Signed: _____ Date: _____

Appendix J – Semi-structured teacher interview guidelines

Research Questions relevant to the creators of the project

1. Does the G9IERP cover all the environmentally-based NCS Learning Outcomes as indicated by the teachers involved in the project?
2. How is it anticipated by the teachers that environmental knowledge is accessed by the learners?
3. To what degree is environmental knowledge accessed via this project, and/or is created by this project?

Interview Structure:

1. How did you decide on the topics for the G9IERP?
(Am hoping to gain insight into what pointed the G9IERP toward the five topics of power and water usage in the houses, paper usage at school, drinking water source (bottled water), Grahamstown water quality, and recycling plastic bags; trying to ascertain if the link to the NCS is clear. This could give an indication as to what the knowledge was expected to be and why.)

2. In designing the G9IERP, what kinds of knowledge did you intend for the learners to engage with?
(I am looking for the kinds of background knowledge that would have been important to the various topics, as well as the new knowledge that was created in the project. The answers here would allow for a comparative analysis between expectations of the teachers in the LA's, the designers, and the NCS).

3. How did you plan and/or anticipate that the learners would access this knowledge about their topic?
(Here I am looking for the sources of knowledge that the creators thought the learners would have access to – eg from their respective LA teachers (or just one LA?), from the internet, books, experts, the co-ordinator etc. This would form part of the key analysis section of the research)

4. Did you anticipate that anything would be done with the knowledge that was created through this project?
(This question could look to the agency created through the project. While not in my proposal, could be the aspect that takes the project to a new level)

5. In all the feedback that you received, was there any mention of knowledge specifically as an issue that was raised? If so, can you recall what?
(Am looking for evidence that may not be apparent in the learners' documentation –formal assessment - that the teacher may have picked up on. This would be useful as a further source of data regarding the knowledge component of the project)

Research Questions relevant to the interviews of the teachers

1. Does the G9IERP cover all the environmentally-based NCS Learning Outcomes as indicated by the teachers involved in the project?
2. How is it anticipated by the teachers that environmental knowledge is accessed by the learners?
3. To what degree is environmental knowledge accessed via this project, and/or is created by this project?

Interview Structure:

1. How did you plan your Learning Area's component of the G9IERP?
(Here I am looking for an indication that they visited the curriculum statements, considered what could be covered in the G9IERP, fed suggestions through to Claudia, ensured that content was in fact covered via the meetings held in the build up phase of the project. This information will be useful to inform on what considerations were given to the project design, and which areas of the NCS were anticipated would be covered by the project, and possibly what knowledge was given focus to. Will help to look at the NCS requirements, the anticipated knowledge and the actual documentation)

2. Generally, outside of the G9IERP, how do you build knowledge in your teaching practice?
(Here I am looking for the teacher's standard practices of imparting knowledge so that I can compare it to how knowledge was dealt with during the project phase. This will be useful in considering whether knowledge was dealt with in a 'normal' fashion, or if this was a new way of dealing with knowledge for the teacher and learners. It could also be useful to feeding back to the teachers in a workshop/focus group session on how knowledge could be better dealt with in the project)

3. Specifically, in the G9IERP, how did you plan or anticipate that the learners would access the content knowledge relevant to the project?
(Looking for preparation before embarking on the project, any documents given to the learners or websites suggested to the learners, whether learners approached them during the project phase to ask about the content knowledge. This would be the key to the research analysis)

4. Afterward, can you recall any indication that the learners had engaged with knowledge that was relevant to their project and your learning area?
(Am looking for evidence that may not be apparent in the learners' documentation –formal assessment - that the teacher may have picked up on. This would be useful as a further source of data regarding the knowledge component of the project)

5. Did you, as a teacher, do anything with the new knowledge that was created through this project?
(This question could look to the agency created through the project. While not in my proposal, could be the aspect that takes the project to a new level)

Appendix K – Focus Group guidelines

Were the topics of the research focus ever formally taught to you?

Where did you get the knowledge about your research focus needed for the contextualization of your project from?

On completion of the research, did your practices change regarding your research focus?

Did you ever use, refer to, or discuss your research?

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