

**THE INTEGRATION OF THE ENVIRONMENTAL
AWARENESS ISSUES IN THE TEACHING OF LIFE-
SCIENCES IN THE FURTHER EDUCATION AND
TRAINING (FET) BAND**

**A CASE STUDY OF THE EXPERIENCES OF THE
GRADE 10 EDUCATORS IN THE TEMBA SCHOOL
DISTRICT**

by

FLORAH MOLEKO TEANE

Submitted in partial fulfillment of the requirements for the degree of

**MASTER OF EDUCATION WITH SPECIALIZATION IN
CURRICULUM STUDIES**

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR : PROFESSOR N.C.G VAKALISA

November 2007

DECLARATION

I, Florah Moleko Teane, declare that the integration of environmental awareness issues in the teaching of Life Sciences in the further education and training band. A case study of the experiences of the Grade 10 educators in the Temba school district is my own work and that all sources that I have used and or quoted have been indicated and acknowledged by means of complete references.

ACKNOWLEDGEMENTS

I wish to convey my sincere gratitude to the Almighty and to all people who made this study a success. The completion of this research could have been more challenging if not impossible without the support from my supervisor Professor N.C.G. Vakalisa.

Special thanks go to my husband Martin, for his continued support, even during difficult and most trying times, when he had to fend for our two sons and a daughter, Rapulana, Thato and Kamogelo, loaning and returning books from the library as I spent most of the time working on my dissertation. I also wish to thank my mother and my siblings James, Milwes, Gift, Abel and Levy for their emotional support and encouragement throughout my years of study. My gratitude is also conveyed to my uncle Simon and his wife Judith for their continued guardianship since I was born. I also wish to thank Tillie Kloppers who was my editor. To respondents who unselfishly sacrificed their time to support my efforts by responding to the interviews and class observations, I say thank you very much.

ABSTRACT

The purpose of this study was to establish whether educators of Grade 10 integrate environmental awareness issues in the teaching of the Life Sciences learning area as prescribed by the National Curriculum Statement (NCS).

Related literature was reviewed on the changing curriculum in South Africa (NCS) as well as Environmental education to place in context the problem of the study, namely to figure out whether educators do integrate environmental awareness in the teaching of Life-Sciences learning area.

A qualitative methodology research was used. School principals and educators were selected to participate in the research.

The findings of the research showed that educators did not integrate environmental awareness in the teaching of Life sciences learning area. Respondents suggested that educators need to be retrained so that they could implement the principles of NCS effectively.

TABLE OF CONTENTS

	PAGE
CHAPTER 1: INTRODUCTION AND ORIENTATION	
1.1 BACKGROUND	1
1.2 INTEGRATION OF ENVIRONMENTAL EDUCATION INTO LIFE-SCIENCES	6
1.3 CHALLENGES FACED BY EDUCATORS IN THE IMPLEMENTATION OF THE NEW CURRICULUM	20
1.4 STATEMENT OF THE PROBLEM	21
1.5 DEFINITIONS OF TERMS	22
1.6 EXPLANATION OF CONCEPTS	23
1.6.1 The concept Life-Sciences	23
1.6.2 The concept environment	24
1.6.3 The explanation of the concept Environmental Awareness	26
1.6.4 The concept integration	27
1.6.5 The concept Triangulation	28
1.7 OBJECTIVES OF THE STUDY	28
1.8 MOTIVATION OF THE STUDY	29
1.9 LIMITATIONS OF THE RESEARCH	29
1.10 RESEARCH METHODOLOGY	30
1.10.1 The research design	30
1.10.2 Data collection	30
1.10.3 Data analysis	31
1.11 CHAPTER SUMMERY	31

TABLE OF CONTENTS

	PAGE
CHAPTER 2: LITERATURE REVIEW	
2. CURRICULUM CHANGE IN SOUTH AFRICA AND OTHER COUNTRIES AND THE PRINCIPLE OF INTEGRATION IN THE TEACHING OF LIFE SCIENCES	33
2.1 INTRODUCTION	33
2.2 CURRICULUM CHANGE IN SOUTH AFRICA AND GLOBALLY	36
2.3 TEACHING LIFE SCIENCES IN AN INTEGRATED WAY: THE OBE APPROACH	41
2.3.1 Integration as an integral part of teaching	42
2.3.2 The need for the integration of Life Sciences with environmental awareness	44
2.4 FACTORS THAT MADE THE IMPLEMENTATION OF THE CURRICULUM TO BE CHALLENGING	46
2.5 CHAPTER SUMMARY	47
CHAPTER 3: METHODOLOGY	
3.1 CHARECTERISTICS OF QUALITATIVE RESEARCH DESIGN	49
3.2 MULTIMETHOD STRATEGIES	50
3.2.1 Researchers' role	50
3.2.2 Context sensitivity	51
3.2.3 Sampling	51
3.2.4 Case study design	51
3.2.5 Phases for data collection and analyses strategies	52
3.2.6 Importance of qualitative research for this study	52
3.3 RESEARCH DESIGN	53
3.3.1 Selection of respondents	53
3.3.2 How prospective respondents were reached	54
3.3.3 Method of data collection	54
3.4 ETHICAL ISSUES	55

TABLE OF CONTENTS

	PAGE
3.5 DATA ANALYSIS AND INTERPRETATION	56
3.6 ADEQUACY AND TRUSTWORTHINESS	57
3.6.1 Trustworthiness	57
3.6.2 Credibility	58
3.6.3 Transferability	58
3.6.4 Dependability strategies	59
3.6.5 Conformability	59
3.7 CHAPTER SUMMERY	59
 CHAPTER 4: DATA ANALYSIS AND INTERPRETATION	
4.1 EXPLAINING THE MEANING OF DATA ANALYSIS	60
4.2 DATA ANALYSIS	61
4.3 DISCUSSION OF EMERGING ISSUES FROM THE DATA	62
4.4 DATA INTERPRETATION	69
 CHAPTER 5: CONCLUSION AND RECCOMENDATIONS	
5.1 CONCLUSION	73
5.2 RECOMMENDATIONS	75
 REFERENCES	79
 APPENDICES	84
Appendix 1	
Appendix 2	
Appendix 3	
Appendix 4	
Appendix 5	

14 June 2008

Planning and Coordination
TvW Building, Room 4-56
UNISA

ATTENTION: MRS TEANE

Dear Madame

EDITING, PROOFREADING DISSERTATION

The above refers.

14/6/08	13:00 to 14:00	1 hr
15/6/08	05:00 to 06:00	1 hr
	08:00 to 10:00	2 hr
16/6/08	09:00 to 10:00	1 hr
	11:00 to 13:00	2 hr

TOTAL 7 hours @ R80,00 per hour
(printout and corrections included)

TOTAL AMOUNT = R560,00

Hope the above is in order and thank you for making use of my services.

Thank you

TMT Kloppers (Tilly)
Cell: 082 7530 525

CHAPTER 1

INTRODUCTION AND ORIENTATION

The purpose of this study was to establish whether educators of Grade 10 integrate environmental awareness issues in the teaching of the Life-Sciences learning area as prescribed by the National Curriculum Statement (NCS). This chapter introduces the study and its contexts. It also broadly outlines the methods that were used in collecting and analyzing data.

1.1 BACKGROUND

Curriculum change in South Africa (S.A.) has been an ongoing thing as early as the 1930's (Gultig, Hoadley & Jansen, 2002:135). The study seeks to describe how a change of curriculum in S.A. was experienced by educators after the African National Congress (ANC) government came into power in the year 1994. The issue of a curriculum in S.A. has been a 'political activity' (Woods, 1996:29) because the government of the day stipulated 'what' was to be taught and 'how'. Prior to 1994, education, hence curriculum was determined by the Nationalist government with its policy of apartheid. According to the policy of apartheid, Education was run by separate departments in the different homelands. It was also a policy that brought a division in Education between the four racial groups in South Africans. In trying to bring Reconstruction and Development Program (RDP), in S.A., the ANC Government sought to bring about a change in the Education System of S.A. through a National Curriculum Statement (NCS) which would encourage 'Lifelong learning through a National Curriculum Framework' (Education Labor Relation Council (ELRC), 2003:H46). A new curriculum, which was adopted from an alien country (Australia) was initially planned for Grades R-9 and later to proceed to the FET (Further Education and Training), to be fully employed by the end of 2005 and hence the name Curriculum 2005 (C2005). The study focuses on the implementation of the new curriculum in the Further Education and Training band, specifically the teaching of Life-Sciences Grade 10. According to the proponents of the new curriculum, the old curriculum was more content-based as compared to the new one which was outcomes-based. According to Bernstein, in Gultig et al. (2002:101) Education in

the past was based on mastery of the knowledge content and less on skill acquisition. The new curriculum strove for the acquisition of skills, knowledge, attitudes and values. The Minister of Education Professor Kadar Asmal indicated the importance of the new curriculum in the Foreword of the NCS document as:

“It has become imperative for the curriculum to shift away from the traditional division between academic and applied learning, theory and practice, knowledge and skills. The integrated education and training will stimulate and empower learners to acquire and apply knowledge, skills and values to confidently and creatively respond to the challenges of the changing social, political and economic environmental through Life-long learning” (Department of Education (DoE), 2003:1).

Since the new curriculum was at its first year of implementation in the FET band during the time when this study was conducted (2006), the researcher sought to find out how Grade 10 educators experienced the implementation of this mammoth task, especially the integration of Environmental awareness issues in the teaching of Life-Sciences learning area. The researcher’s main concern was the inherent flaws in the implementation of the policy as discovered by the Review Committee under Prof. Kadar Asmal as well as Jansen’s report which was done during the first year of implementation of this curriculum (the year 1998). The discovery of the above-mentioned flaws which caused the new curriculum to get stuck in the General Education and Training band (GET), led to the revision of the original curriculum 2005 into the a Revised National Curriculum Statement (RNCS) (ELRC,2003:H43).

The Revised National Curriculum Statement (RNCS) was based on the eight principles that underpin curriculum development in South Africa namely:

- Social justice
- Healthy environment
- Human rights and inclusivity
- Outcomes-Based Education (OBE)
- A high level of skills and knowledge for all
- Clarity and Accessibility
- Progression Integration

The Outcomes-Based Education (OBE) principle advocated for a competence approach versus a performance approach (Hoadley & Jansen, 2002:123). In the performance approach, the curriculum encouraged learners to memorize Life-Sciences content. Teaching and learning was teacher-centered i.e. the teacher transmitted knowledge according to defined pedagogical rules. Conversely the new approach (competence-based) which is outcomes-based has as its starting point, the intended results of learning in terms of knowledge, skills and values (Lubisi, Parker & Wedekind, 1998:9). The teaching of Life-Sciences learning area is based on the three learning outcomes (LOs) to be achieved by each learner (Hoadley & Jansen, 2002:123) namely:

- *learning outcome 1*: Scientific inquiry and problem solving skills;
- *learning outcome 2*: Construction and application of Life-Sciences knowledge;
- *learning outcome 3*: Life-Sciences, technology, environment and society.

The three learning outcomes encourage learners to acquire knowledge as well as apply knowledge to solve real life problems and they are built on the critical and developmental outcomes. The seven critical outcomes require learners to be able to:

- Identify and solve problems and make decisions using critical and creative thinking.
- Work effectively with others as members of a team, group, organization and community.
- Organize and manage themselves and their activities responsibly and effectively.
- Collect, analyze and critically evaluate information.
- Communicate effectively using, symbolic and or language skills in various modes.
- Use science and technology effectively and critically showing responsibility towards the environment and the health of others.
- Demonstrate an understanding of the world as set of related systems by recognizing the problem solving contexts does not exist in isolation.

The developmental outcomes require learners to be able to:

- reflect and explore a variety of strategies, learn more effectively,
- participate as responsible citizens in the life of local, national and global communities,
- be culturally and aesthetically sensitive across a range of social contexts,
- explore Education and career opportunities, and
- develop entrepreneurial opportunities.

The teaching of Life-Sciences syllabus was seen in the past as rigid, textbook bound and the content paced to rigid time frames (Kraak, 1998:158). The evaluation of such a curriculum was examination driven and exclusionary since those learners who were not “good examination writers” could not get a pass and were labeled incapable. Kraak also posited that assessment in the old curriculum was examination centered and focused on absences (what the learner has left out). The examinations written at the end of the year carried more weight than other tasks written during the year. Conversely the outcomes-based Education requires that educators move from norm-referenced to criterion referenced forms of assessment (Lubisi et al. 1998:49). An assessment method which compares learner achievement with the other learners’ achievement (norm-referenced assessment) was used rather than criterion-referenced assessment which compared learner performance against a set of stipulated outcomes. The former approach was competitive and frustrated low achievers. According to the new approach, all learners have the potential to learn successfully. The new curriculum used continuous assessment (CASS) strategy. Unlike in the old curriculum, the CASS components namely, practical work, research, assignments, tests, and projects seek to ensure that a holistic form of teaching and evaluation takes place.

1.2 INTEGRATION OF ENVIRONMENTAL EDUCATION INTO LIFE-SCIENCES

The term integration is very broad and could refer to merging the gap between theory and practice as posited by Kadar Asmal in his foreword (1.1) above, or according to Kallaway, Kruss, Faar & Donn, (1997:121) integration can be seen through inter-ministerial mechanisms, or defined by the department of Education as occurring within subjects and as

involving the grouping of assessments standards that link naturally (NCS Grade 10-12 General, 2005:2).

For the sake of this study, the Department of Education's definition of integration (2003:5) would be considered i.e.: an integrated approach to Education and training implies a view of learning that rejects a rigid division between academic and applied knowledge, between theory and practice, between knowledge and skill. This means that during the teaching and learning process the learning content should be linked with skill development and application of such content i.e. the learners must be in position to use the learning content to solve real life problems.

The proponents of the National Curriculum Statement in S.A. propagated for teaching and learning process which did not separate learning areas i.e. that viewed all learning areas as being interrelated. These proponents also argued that the old curriculum was compartmentalized whereby learners were not made aware of the link between subjects.

The study focused on whether educators were infusing environmental awareness in all aspects of teaching Life-Sciences learning area not only teaching about the environment when ecology is being taught as was the case in the old curriculum. The integration of Life-Sciences with environmental Education implies that when a teacher teaches about a process of photosynthesis he or she must make learners aware of the importance of for example water conservation as well as Arbor day. According to the new curriculum, this way of teaching Life-Sciences learning area would help in solving real life problems associated with the depletion of natural resources such as a decreasing biodiversity, deforestation, overpopulation and pollution (De Fina, 1995:33).

The study sought to find out whether educators are ready to shift from the old way of teaching Life-Sciences learning area to the new way which was outcomes-based. Considering some notable discrepancies prevalent in the planning between the old and the new curricula, one would wish to inquire whether educators would be flexible enough to infuse environmental awareness issues in their teaching of Life-Sciences content.

On the next page a template Scheme of Work which was used in the old curriculum is Reflected.

(DoE, 2004:13. BIOLOGY SCHEME OF WORK (YEAR PLANNER))

The accompanying table indicates the new way of planning Life-Sciences content according to the National Curriculum Statement (NCS).

Below is an educator's Work Schedule which was planned according to the contextual factors of the school in which the educator was teaching.

When comparing the two year planners, one would notice a greater change in as far as Life-Science content as well as the teaching approach is concerned. The old year planner shows the different topics in Life-Sciences Grade 10 with some time frames. The forms of assessment as displayed are Tests and Examinations. There was no learning outcomes to focus on and the only part that concern the environmental study was on Ecology.

Conversely, the topics covered by the New Year planner are slightly different from the one that appear in the old year planner. A big difference is noted on the teaching approach e.g. In all the learning programs of the new year planner, specific learning outcomes, integration, assessment tools as well as the teaching strategies are outlined.

As an educator, I was challenged by the demands brought by the new Education System i.e. moving away from the content-based form of curriculum to the curriculum which was outcomes-based. The challenges raised my curiosity as a researcher to want to investigate whether educators out there are able to intersperse ecology in their daily teaching of Life-Sciences content and remove it from the drawer as it has been the case.

Since the new curriculum's objectives include acquisition of skills, knowledge, attitudes, and values, various topics in biology had to be taught in such a way as to raise the level of student's awareness on environmental issues and to give standard topics a greater social significance (De Fina, 1995:33).

An integrated approach to various aspects of life-sciences are outlined by De Fina (1995.:33) as follows:

- ecology topics provide excellent opportunities for raising students' environmental awareness e.g. topics about interactions of the biotic and a biotic components of the ecosystem will enhance learner understanding of sustainability and conservation of natural resources.
- In taxonomy, teachers can address species extinction as a consequence of human activity that interferes with nature's ability to maintain balance in the ecosystem.

- In biochemistry, the properties of water and other inorganic substances can be integrated with issues of water pollution and chemical pollution.
- In energy reactions, cellular respiration can lead to fossil fuel combustion and nonrenewable versus renewable energy sources.
- In cell structure and function, chemical pollution issues relate to causes of human cancer, a prime topic to discuss cell abnormalities.
- In genetics and development, biology teachers can also infuse both chemical pollution and nuclear environmental issues into the genetics and development topics of DNA damage and birth defects.
- In human biology, investigations of human anatomy and physiology provide appropriate windows for teachers to introduce aspects of overpopulation and urban living.

Applying De Fina's (1995:36) principles of integration in the South African context implies that:

- In Taxonomy, educators had to make learners aware of the economic impact in S.A. that was brought by organisms that become extinct. Learners had to be made aware about the danger brought by the killing of the marine plant and animals by oil spills from ship's tanks.
- In biochemistry learners had to be made aware of pollutions, both water and chemical which brought diseases such as cholera. Learners should also know the danger brought by such pollutions to zooplanktons that form part of the food chain. Pollution can also destroy animals such as fish and this will cause the selling price of the fish to go up.
- In energy reactions learners attention had to be brought to fossil fuel problems encountered in S.A. e.g. A petrol price that was escalating nearly every month, making transport tariffs to be high.

- In cell structure and function learners had to be made aware of an increased death rate in S.A. caused by cancer.
- In human anatomy and physiology learners should see the impact of refugees in S.A. e.g. the development of squatter camps with poor sanitation that made the spread of diseases (including Hiv/Aids) to move very fast.

The old curriculum did not encourage integration of environmental awareness with regular sub-topics of Life-Sciences, because the content was not geared to solving real life problems (De Fina, 1995:36). By infusing environmental awareness in the teaching of Life-Sciences content would make learners aware of the challenges they were facing and would encourage these learners to work on some strategies to curb these problems. The above-mentioned learner engagement skill is supported by the learning outcome number one namely, Scientific inquiry and problem solving (DoE, 2005:2).

The need for the integration of environmental Education into learning areas is supported by Leketi as cited by Lebeloane (1998:11) who states that teaching about and for the environment can be used as a vehicle for the development of environmental awareness and consciousness. These authors meant that the teaching process must reflect environmental issues to be mastered by learners so as to instill love and caring for the environment.

The concern about maintaining, protecting and improving the environment has been an international issue since the beginning of the 20th century. This is shown by a number of international conferences on environmental issues held in a number of countries and treaties/protocols agreed upon at these conferences. Amongst the most important protocols were recommendation 96 of the Stockholm conference (1972), the Belgrade charter (1975), Tbilisi declaration (1977), the world conservation strategy (1980), the Brudland Report (1987) as well as the Montreal protocol concluded in 1987 whereby countries agreed to phase out the use of chloroform carbons (CFCs) by 1996 (Tlhabanelo, 2004:3).

1.3 CHALLENGES FACED BY EDUCATORS IN THE IMPLEMENTATION OF THE NEW CURRICULUM

The research conducted by Jansen concerning Outcomes-Based Education (OBE) implementation in Kwa-zulu Natal and Mpumalanga during the first ten months of 1998, showed some important trends regarding OBE implementation (Jansen & Christie, 1999:73). His findings were that teachers held vastly different understanding of what OBE was all about. According to Jansen & Christie (1999:75), the causes of improper implementation of OBE included the teachers' feeling of comfort and security with the familiar, the lack of in-depth training, the uncertainty of planners and trainers themselves and the lack of on-site supervision that had not been resolved.

Apart from all the flaws inherent in the implementation of OBE, educators themselves responded differently to curriculum change. A Canadian educator McLaughlin, who has studied curriculum change in hundreds of North American classrooms, argued that a teacher responds to curriculum change in one of three following ways (Hoadly & Jansen, 2002:34) namely:

- co-option: new curriculum is implemented with no real changes in the teachers and learners,
- non-implementation: curriculum plan is simply ignored by educators,
- mutual adaptation: the curriculum is changed or modified in the process teaching.

Since the NCS was at its first phase of implementation in 2006 in the FET band, the researcher wished to find out how educators were experiencing the implementation of the new curriculum of Life-Sciences at classroom level. The main focus of the researcher would be investigating whether educators were integrating environmental awareness into Life-Sciences.

1.4 STATEMENT OF THE PROBLEM

According to McLaughlin (1997:183), successful curriculum change depends mainly on implementation strategies that include effective staff training, frequent staff training, frequent staff meetings and local materials development. This statement implies that the

implementation of change in schools needed some proper planning. Newton and Tarrant (1992:76) outlined four basic features that can be expected from organizational Change, namely:

1. Triggers: change started by some kind of disorganizing pressure or trigger arise from inside or outside the organization.
2. Interdependence: change in some aspects of an organization creates pressures for adjustment in other aspects.
3. Conflict and frustration: Technical and economic objectives of managers may well conflict with the needs and aspiration of employees resulting in conflict that creates pressures resistant to change.
4. Time lag: Change rarely takes place very smoothly and usually happens untidily, some parts of an organization changing more rapidly than others, with certain groups and individuals needing time to catch up with everyone else.

Keeping in mind all the challenges that are usually associated with the implementation of a new curriculum the research problem to be examined may be stated as follows:

How are the grade 10 Life-Sciences educators coping with the new curriculums imperative to integrate environmental awareness in the teaching of Life-Sciences?

1.5 DEFINITION OF TERMS

Life-Sciences: A learning area that enables learners to explore concepts that is essential for understanding basic life processes and the interrelationship of components of the living and physical world (DoE, 2005:9).

Environment: The concept ‘environment’ has been defined from various perspectives by a number of authors. It has however, over the past decades acquired a more specialized meaning for usage in ecological sense, which entails the sum total of all external conditions

which may influence any organism including humans (Environmental Conservation Act no. 37 of 1997) (Tlhabanelo, 2004:3). In this sense the environment refers to all the biological, physical and sociological elements of an area.

Integration: The Oxford English dictionary defines integration as the making up or composition of a whole by adding together or combining the separate parts or elements into an integrated whole. The national curriculum statement for grades 10-12 stated that integration is achieved within and across subjects and fields of learning. The integration of knowledge and skills across subjects and terrains of practice is crucial for achieving applied competence as defined in the national curriculum framework (NQF). The NCS seeks to promote an integrated learning that would breach the gap between knowledge acquisition and problem solving.

1.6 EXPLANATION OF CONCEPTS

1.6.1 The concept Life-Sciences

The concept Life-Sciences refers to a subject or learning area which was formerly called Biology. It involves the systematic study of life in the changing natural and human made environment (DoE, 2003:9). This systematic study involves critical inquiry, reflection, and the understanding of science concepts and processes and their application in society. The National Curriculum Statement Grade 10-12 General (2003) outlines the purpose of Life-Sciences learning area as indicated below:

- To enable learners to explore those concepts that are essential for understanding basic life processes and the interrelationships and independence of components of the living and physical world.
- To develop in learners' inquiry, problem solving, critical thinking and other skills which learners will use to interpret and use Life-Sciences concepts in explaining the phenomena they encounter in their environments.

- To enable learners to apply scientific knowledge in their personal lives and as responsible citizens in ways that will contribute to a healthy lifestyle and the sustainable management of resources.
- To develop in learners understanding of the nature of science, the influence of ethics and biases, and the interrelationship of science, technology, indigenous knowledge, environment and society.
- To enable learners to understand biological, physiological, environmental, technological and social processes that impact on the environment (e.g. food production, distribution and consumption, health promotion, conservation, sustainable living and genetic engineering) (DoE, 2003:9).

Brody (1991:24) defines Biology Education as being “concerned with helping students learn basic concepts related to the environment and the potential consequences of people’s actions.” To insert this goal, science classrooms should encompass elements of Biology, ecology, animal behavior, Zoology, natural history and human ecology (Chipman & Brody, 1993:11).

1.6.2 The concept ‘environment’

The concept ‘environment’ has been defined from various perspectives by a number of authors. Environment as a concept has broadened over time. About fifty years ago when awareness of a possible environmental crises first developed, ‘environment’ was mostly used to refer to nature or the biophysical elements of our surroundings. Later the concept of the ‘environment’ came to include “urban and built” surroundings (Le Roux, 2000:19). O’Donoghue, (2001) shows four related dimensions of the environment namely, the biophysical, economic, social and political. The environmental problems in all these four four-dimensions are represented schematically below:

Biophysical (natural world of plants and animals that soil supports)

	Soil erosion	Economic dimension
Social Economic dimension The way people live together is often determined by and in turn determines the quality of soil		
Political How apartheid policies forced people to live in certain areas often already badly degraded and leaving people no choice but to further exploit over exploited land.		

For the sake of this study Trivedi & Singh's (1993) definition of an 'environment' will be used namely, 'environment is all that surrounds man and his family of living species and governs, affects and or influences life in general'. According to the above-mentioned authors, environment includes the following:

- the atmosphere: particulate and gaseous matter surrounding the earth,
- the biosphere: plants and animals on earth,
- the lithosphere: soil, mineral matter, earth mantle core etc.
- the hydrosphere: water in all states of aggregation and manifestation on the surface and inside of the earth.

1.6.3 The explanation of the concept environmental awareness

Environmental awareness refers to a collective consciousness for conserving natural resources (Trivedi & Singh, 1993: 250). These authors regard Education as the only tool through which parents at home and teachers at school can inculcate in the child respect for air, land and water. Environmental factors that pose a threat to life here on earth and against which human beings have to guard include, the decreasing biodiversity, deforestation, and habitat loss, overpopulation and pollution. The worsening of the above-mentioned factors made the issue of relating Life-Sciences with the environmental Education very important. The environmental issues which form part of the eight principles of RCNS were the government's reason to focus on the problem about the depletion of natural resources. The environmental awareness and protection is also enshrined in the constitution. Section 24 of the constitution of South Africa states that every South African has a right to an environment that is not harmful to the health or well being of living things have the environment protected for the benefit of the present and future generations, through reasonable legislative and other measures: prevent pollution and ecological degradation: promote conservation: secure ecological sustainable development and the use of resources while promoting justifiable economic and social development (Constitution, 1996:11) The Reconstruction and Development Program (RDP) document of South Africa which was initiated in 1994 advocates for a program to: 'rekindle our people's love of the land to increase environmental consciousness among our youth to coordinate environmental Education policy at all levels, and to empower communities to act on environmental issues and provide an environmental ethic'. Scott and Oulton (1998:211) outline the importance of values of environmental Education as follows:

Goal The ultimate goal of Environmental Education is to develop informed and skilled citizens who are willing and able to take action and resolve environmental issues.

Task The long term task of Environmental Education is to foster or reinforce attitudes and behavior comparable with a new ethic of embracing plants and animals as well as people.

Aim Environmental Education aims to provide opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment, encourage pupils to examine and interpret the environment from a variety of perspectives.

Learning process Environmental Education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among people, their culture and biological physical surroundings.

1.6.4 The concept integration

The term integration ensures that the learner experiences the learning area as linked to the environment (Education Labor Relation Council, 2003:H47). In this study, integration is between Life-Sciences and Environmental Education. Life-Sciences educators are better positioned to relate content they teach to the environmental issues that pose a threat to human kind. According to the principle of integration, the teaching process between the learning areas had to link knowledge with skills, attitudes and values.

1.6.5 The concept triangulation

De Vos, Strydom, Fouché & Delport (2003:341) describe four forms of triangulation as follows: Triangulation of measures: the researcher measures something in more than one way.- Triangulation of observers: the researcher employs more than one observer to reduce Limitations.- Triangulation of theory: the researcher uses multiple theoretical perspectives early in the planning stages of research or when interpreting the data. - Triangulation of method: the researcher mixes qualitative and quantitative styles of research and data. For the sake of this study, both triangulation of observers and triangulation of methods for collecting data will be employed.

1.7 OBJECTIVES OF THE STUDY

The main aim of this research was to investigate whether Life-Sciences educators' approaches to teaching and learning have changed in accordance with what the new curriculum requires. The research attempted to answer the following questions:

- What do teachers think about the new approach in Education?
- Are educators aware of recommended teaching methodologies that lead to environmental awareness among learners?
- How do teachers cope with the design down approach to teaching Life-Sciences i.e. staff begins their curriculum and teaching planning where they want students ultimately end up and build back from there (Lubisi, Parker & Wedekind, 1998:27).

1.8 MOTIVATION OF THE STUDY

Since the NCS was at its first phase of implementation in grade 10 at the time when this research was started (2006), it was necessary to find out how a change of curriculum was being managed in schools. The many difficulties inherent in the Education System of South Africa that were a legacy of apartheid made me as a researcher, to wonder if things would function well in the implementation of the NCS. Since the inception of the new curriculum (C2005) there have been difficulties because the formulation of policy was separated from its implementation (Christie, 1999:281). Factors such as lack of teacher engagement in the drawing of the curriculum framework for the learning areas, resource strapped circumstances of the provinces and the adoption of the rationalistic tradition approach to policy, could have had a negative impact in the implementation of the new curriculum. The move to a Revised National Curriculum statement (RNCS) in the year 2000 was itself an acknowledgement of the challenges in the implementation of the original curriculums OBE approach. In addition to what Jansen (1998) discovered, the study would add some information by finding out whether there is improvement in the implementation of OBE or not. If recurrent flaws are discovered, the findings of the study may assist policy-makers in future to plan implementation of new policies more cautiously, taking into consideration situations in the schools.

1.9 LIMITATIONS OF THE RESEARCH

The research done was a case study, which was an exploration or in-depth analysis of a single or multiple cases over a period of time (De Vos, Strydom, Fouché & Delpont, 2003:275) thus whatever findings in the data collected has been said, they could not be generalized to all educators in South Africa because this was a case study. But findings can be compared with other researchers in other areas in South Africa. Since the respondents were educators, it was impossible to have a long engagement with them. My findings were therefore not collected over a long time as required by a case study design.

1.10 RESEARCH METHODOLOGY

1.10.1 The research design

Mouton (2003:55) defines a research design as a plan or a blue print of how you intend conducting the research. For the sake of this study, I will use descriptive design to do my study i.e. the researcher will fully describe how the integration of environmental awareness issues with the teaching of Life-Sciences learning area, is achieved in his/her teaching. Since this research sought to investigate how educators were coping with the integration of environmental awareness in their teaching Life-Sciences curriculum, I would be able to discover that when I am in the respondents' natural setting as suggested by Mouton (2003:56). The study of this nature required the use of a qualitative research methodology since as posited by Eisner (1991:32) qualitative research tends to be field focused (embedded in the natural setting).

1.10.2 Data collection

Data collection methods in this study included classroom observation, in depth interviews with educators, and document analysis (lesson plans, class schedules)

1.10.3 Data analysis

Data analysis followed data collection. It entailed working with data, organizing it, searching for patterns, to identify what was important and what could be learned as well as deciding what the researcher could tell others (Bogdan and Biklein, 1992:153). Tesch's proposed eight steps in data analysis was used (De Vos et al., 2002:340-341).

1.11 CHAPTER SUMMARY

In chapter 1 the researcher has outlined the problem to be researched. The objectives of the study were discussed as well as curricula changes that led to the research.- The problem for investigation has been stated against the background of the challenges facing educators in the implementation of the new curriculum namely the National Curriculum Statement.- The need for this inquiry has been justified by explaining the loopholes in SA in as far change management was concerned- The researcher has tried to delimit the area of this study. Research procedures and methods to be used in this investigation have been outlined- The terms pertaining to the subject of this study have been briefly defined to effect further delimitation of the field of study. Finally the whole study program has been outlined. The envisaged work has been grouped into five chapters. The study comprises an in-depth study of relevant literature to create a theoretical frame of reference for generalizations and recommendations resulting from findings of the research. Data collection techniques comprise interviews with educators, lesson observations and document study. Data analysis and interpretation of data was done to evaluate educators inculcate environmental awareness issues in their teaching of the Life-Sciences learning area.

CHAPTER 2

LITERATURE REVIEW

2. CURRICULUM CHANGE IN South Africa AND OTHER COUNTRIES AND THE PRINCIPLES OF INTEGRATION IN THE TEACHING OF LIFE-SCIENCES

2.1 INTRODUCTION

Prior to the adoption of the new curriculum (C2005) in South Africa, the Education System was divided before as well as during the Nationalist government with its policy of apartheid. Segregation in South Africa involved attempts to regulate and control class status on the basis of racial characteristics using both ideologies and repressive means (Christie & Collins in Gultig et al., 2002:132). According to Christie and Collins, segregated schools affirmed the division between color-castes with different systems preparing blacks and whites for their respective sub-ordinate and super ordinate positions. It was against the above-mentioned discrepancies in Education in S.A. that the ANC government sought among other things to overcome the legacies of apartheid Education and prepare South Africans for the 'challenge of competing in the global economy' (DoE, 2000:3). South Africa thus adopted a new Education and training system whose major thrust was a notion of 'Lifelong learning organized in S.A. in terms of National Qualification Framework (DoE, 1995:4). The old curriculum differed from the new one since its main aim (especially for blacks) was the reproduction of labour (Christie & Collins in Gultig et al., 2002:135). In black schools learners learned skills necessary for participation in the capitalistic mode of production. The new curriculum's role was to overcome the stultifying legacy of apartheid by ensuring a deeper knowledge, values and skills-base for South Africa's citizens (DoE, 2000:3). The ANC government (also called the government of national unity), adopted an Education System in S.A. which was to bring about unity in all spheres of life including Education. Unlike the old curriculum which stipulated separate curricular for black and white South Africans, the ANC government propagated for a curriculum which was uniform to all South Africans and which culminated in the FET band. The move from an Education System which was said to be

content-based (according to the propagators of the new curriculum) to an outcomes-based Education started in 1998 and was scheduled for grade R-9. Education Labor Relation Council describes the eight RNCS principles that underpin the curriculum cited earlier on (1.1) in chapter 1 as follows:

Social justice, a healthy environment, Human rights and inclusivity

- The curriculum can play a role in creating awareness of the relationship between human rights, a healthy environment, social justice and inclusivity.
- The RNCS has tried to ensure that all learning area statements reflects the above-mentioned principles defined in the constitution.
- The RNCS adopts an inclusive approach by specifying minimum requirements for all learners.

OBE

- OBE considers the process of learning as important as its content.
- Both the process and the content of Education are emphasized by spelling out the outcomes to be achieved at the end of the process.

High level of skills and knowledge for all

- The RNCS sets and holds up high expectations of what South African learners can achieve.
- Social justice requires that those sections of the population previously disempowered by the lack of knowledge and skills should now be empowered.

Clarity and Accessibility

- RNCS aims at clarity and accessibility both in its design and language.
- Two design features:- learning outcomes and assessment standards clearly define for all learners the goals and outcomes necessary to proceed to each successive level of the system.
- RNCS will be available to all official languages and Braille.

Integration

- The principle of integration is integral to OBE.
- Integration ensures that learners experience the learning areas as linked and related.
- It supports and expands their opportunities to attain skills, acquire knowledge and develop attitudes and values encompassed across the curriculum.

Progression

- Conceptual progression is a term used to describe a curriculum that sets out progressively more complex, deeper and broader expectations of learners.
- Assessment standards in each learning area statement must provide the conceptual progression in each learning area from grade to grade.

2.2 CURRICULUM CHANGE IN SOUTH AFRICA AND GLOBALLY

When the new ANC government came into power during 1994, it sought among other things to respond to the needs of globalization (Kallaway, P. Kruss, G. Faar, A and Donn, G, 1997:114). According to Kallaway et al., globalization refers to a multifaceted process entailing a growing world wide interconnectedness of structure, culture and agency, and a parallel de-differentiation of traditional boundaries. In line with the demands of globalization, South Africa introduced an Educational policy that would connect her with other countries worldwide. Kallaway et al. (1997:51) stated four reasons why South Africa(with its unique history) seemed to have followed globalization so uncritical namely,- there is an argument about dependency on world bank policy that the alternatives offered by the left were too weak and could not offer as much as those policies which were eventually adapted that post modern flexible technology and information dictated the pace of change.- that this is but one albeit specific manifestation of the impact of globalization of capital and markets consequent on the ending of the cold war. The four reasons outlined above indicated that South Africa's positive response to the needs of globalization was uncritical (as suggested by Kallaway)because she adopted a new Education System from an alien country without looking at its feasibility. These reasons also pin pointed that a change of curriculum in South Africa was influenced more by external factors than internal needs. Partly as a response to globalization and as a way to remove the disparities and inequities bred by the apartheid regime, the 1995 South

African White paper on Education and training (WPET), which offered the first guidelines on post-apartheid Education policy, committed itself to an integrated approach to Education and training. An integrated approach it argued, implied a view of learning which rejected the then established organization of the curriculum and its attendant inequalities of occupation and social standing, related closely in South Africa to ethnic divisions (Kallaway et al., 1997:111).

The management of change in the South African context experienced some challenges since policy formulation was separated from implementation in S.A. (Jansen, 1998:57). By this Jansen indicated that the government was more concerned about bringing about change in South African Education but overlooked the how part of implementing such a change. South Africa's implementation of change was not in line with what Ornstein & Hunkins (2005:305) called 'Theory of Change'. According to this theory, enacting curricular change must take cognizance of the environmental context within which these changes will be operating. According to Jansen (1998: 58), the South African government did not provide adequate resources for an effective implementation of the policy. Apart from insufficient resources, South Africa's management of change was not of a good standard when critiqued according to the five guidelines for effective curriculum change and implementation by Ornstein and Hunkins (2004:305) below:

Innovations designed to improve student achievement must be technically sound. This means that changes should reflect research about what works and what does not work, as opposed to whatever designs for improvement happen to be popular today or tomorrow. Successful innovation requires change in the structure of a traditional school. By structural change we mean major modifications of the way students and teachers are assigned to classes and interact with each other. Innovation must be manageable and feasible for the average teacher. Implementation of successful change efforts must be organic rather than bureaucratic. Avoid the 'do something, do anything' syndrome. Comparing South Africa's management of change with the guidelines above, one would identify some flaws inherent in the adoption of the new Education policy namely, South Africa used a top down strategy for the implementation of change and the bureaucrats were more concerned about bringing a change rather than making the change to be effective. South African situation was confirmed by Sieborger (Jansen, 1998:58) (who headed the committee for curriculum change) that everything was rushed on. According to Ornstein and Hunkins (2004:305) curriculum development and implementation

require teachers to be members of a 'community of truth'. In such a community teachers involved in curricular decision making focus their joint energies around a great focus in this case curriculum and instruction, and explore its mysteries.

According to Sieborger (Jansen 1998:60) educators in S.A. were not members of the said community of truth since teacher formations battled to have their voice heard in the initial curriculum change process. The information about the management of change in S.A. signaled some challenges to be faced by the implementers of the policy (teachers). Unlike Ornstein and Hunkins (2004) who advocated for the bringing of implementable innovations, Fullan argues that there is no restriction to innovations to be put into action (Fullan, 2001:71). He proposed the management of the factors stated below which are related to the implementation of change namely:

- Needs – innovations must address what are perceived to be primary needs.
- Clarity – teachers must be able to identify essential features of the innovation.
- Complexity – complexity creates problems therefore implementation guidelines must be given.
- Quality and practicality of the program – the inadequate quality and even the simple unavailability of materials and other resources can result when adoption discussions are made on the grounds of political necessity, or even on the grounds of perceived need without time for development.

When adoption is more important than implementation, decisions are frequently made without the follow up or preparation time necessary to generate adequate materials. Relating the above factors to the South African context, Kallaway (1997:113) id that the government saw a need to gear South African Education towards an integrated approach but the 'need' as was the case by then, was a need to do away with the apartheid regime. This manifested itself in the little effort taken to ensure that the implementation of the policy was without stumbling blocks. From his research Jansen (1998:58) discovered that three patterns of educators emerged with respect of teacher understanding and implementation of Outcomes-based Education (1998:58) namely:

Pattern 1: teachers who are clearly not doing anything differently from what they did before.

Pattern 2: teachers who imposed the framework provided by the curriculum on what they had already planned or implemented as a way of demonstrating compliance with official policy, or simply as a way of confirming the claim that ‘we have always done OBE’.

Pattern 3: teachers who were actively negotiating the meaning of OBE within the constraints of their classrooms and the lessons drawn from their experience (Jansen & Christie, 1999:77).

The recommendations made by the review committee appointed by the Minister of Education, Professor Kadar Asmal in 1999 resulted with the bringing of changes in the original curriculum and this bred some confusion to the already confused implementers of the policy. As posited by Kallaway et al. (1997:144), South Africa borrowed more from advanced industrial countries including Australia, and tended to ignore the instructive experiences from societies in transition with similar socio-political democratic agendas and aspirations. They also emphasized that the top-down approach to policy in South Africa was thus criticized because of its narrow definition of policy which overemphasizes the power and the agenda of the policy makers while underestimating the important policy role of other agents at the implementation phase. The finding of Jansen’s (1998:58) research was that some educators resisted change by not doing anything different from what they did in the old curriculum. Ornstein and Hunkings (2004:309) outline some reasons why people resist change namely:

- Lack of ownership: if change is viewed as alien or coming from outside organization.
- Lack of benefits: teachers do not see importance of such innovation.
- Increased burdens: teachers against the issue of adding more work to their workload.
- Loneliness: lack of adequate support.
- Insecurity: if innovation threatens their security
- Norm incongruence: new program must be congruent with the norms and expectations held by the personnel in the system.
- Boredom: if the experience is not enjoyable.
- Chaos: if there is no control in the change itself.
- Differential knowledge: if there is excessive power from those advocating change.
- Sudden wholesale change: people resist change requiring complete redirection.

- Unique points of resistance: fear of the unknown by those who must implement change.

Jansen's report (1998:58) indicated that 'loneliness' (as stated above) was one of the reasons why some of the educators resisted change. Lack of clarity about 'what' was to be taught and 'how' to teach the content bred some poor founding of OBE.

2.3 TEACHING LIFE-SCIENCES IN AN INTEGRATED WAY: THE OBE APPROACH

The outcomes-based Education (OBE) means focusing and organizing an Education System around "what is essential for all students to be able to do to succeed at the end of their learning experience" (Lubisi et al., 1998:24). This means starting with a clear picture of what is important for students to be able to do, then organizing content, teaching and assessment to make sure this learning ultimately happens. OBE was very important in this study since it implied organizing Life-Sciences learning content in relation to the outcome environmental awareness. The implementation of OBE is centered on the four principles which is the heart of OBE namely, clarity of focus, expanded opportunity, high expectations and design down (Lubisi et al., 1998:27).

According to these authors, clarity of focus will help educators establish a clear picture of the learning content they want the students to exhibit in a performance demonstration as well as making a clear picture of the desired outcome, the starting point for curriculum teaching and assessment planning and implementation all of which must perfectly match the targeted outcome. In as far as the design down principle is concerned; Lubisi et al., (1998:27) divided learning outcomes into three broad categories namely, culminating, enabling and discrete outcomes. Culminating outcomes define what the system wants all students to be able to do when their official learning experiences are complete. Enabling outcomes are the key building blocks on which those culminating outcomes depend. Discrete outcomes are curriculum details that are nice to know, but not essential to a student's culminating outcomes. In this study the culminating outcomes are based on the inculcation of environmental awareness issues in the teaching of Life-Sciences learning area. The awareness campaign could be achieved through teaching the relevant content as well as using appropriate assessment

standards to measure learners' achievement of the culminating outcomes. The study would be focused on, learning outcome 3 (Life-sciences, Technology, Environment, and Society) of the Life-Sciences learning area and the assessment standard 2 (comparing and evaluating the uses and development of resources and products, and their impact on the environment and society) (DoE, 2003:37).

2.3.1 Integration as an integral part of teaching

In the new Education System in South Africa the principle of integration forms the integral part of the OBE approach to teaching and learning. Even though educators did infuse environmental awareness issues in their teaching of Life-Sciences learning area, it was done mostly in the teaching of ecology as a topic. The study implied enforcing the environmental awareness issues in every aspect of Life-Sciences teaching. The examples about topics in Life-Sciences and its relation to the environment were discussed earlier on (1.2) in chapter 1. The teaching of Life-Sciences or Biology prior to the new Education System was based on three basic teaching models namely, transmission of information evolution of life flow of energy through living (Solomons, Berg, Martin & Villee, 1996:111). Conversely the new OBE approach outlined the three competencies to be developed by the teaching of Life-Sciences namely, scientific inquiry and problem solving construction and application of Life-Sciences knowledge understanding of interrelationship of Life-Sciences, technology, the environment and society, and different attitudes and values (DoE, 2003:9). As posited by Lubisi et al. (1998:57) integrated approaches seek to combine knowledge, understanding, problem solving, technical skills, attitudes and ethics in assessment. According to these authors, theory and practice across disciplines are combined in the integrated or "holistic" assessment, which can be characterized as: problem solving inter-disciplinary embracing professional practice covering groups of competencies focusing on common circumstances demanding analytical abilities combining theory and practice Kallaway et al. (1997:121) outline three issues to consider if changes in integration are to be infused in the wake of White Paper on Education and Training namely, the complexity of institutional arrangements which full integration would entail any steps towards integration need to be considered through inter-ministerial ministerial mechanisms such as the working group which drew up the NQF bill the implementation issue to consider is the ownership of the policy agenda and the gap between policy formulators and conditions on the ground. The strength of NQF is that it

provides a framework for local initiatives to join national structures, the challenge will be to ensure that this actually takes place the final implementation issue to be considered is the active and contested process of putting agendas into practice. A striking feature of the White Paper on Education and Training is that it is generous in vision and it is short on implementation strategies.

The above mentioned issues indicated the weaknesses of the 'top down' strategy used in the adoption of the new curriculum in South Africa. According to Kallaway et al. (1997:121) the principle of integration will have stumbling blocks since no clear guidelines were set to indicate how to implement this principle. Since the topic of this research study involved integration, one of the tasks of the study would be to find out whether or not educators are able to apply the principle in the teaching of Life-Sciences within the school's time constraints.

2.3.2 The need for the integration of Life-Sciences with environmental awareness

The OBE approach to Education is centered on seven critical and five developmental Outcomes see (1.1). The environmental study form part of the knowledge areas for the Life-Sciences (DoE, 2003:5). Since the new approach is not only about knowledge of content but also application, learners would be able to apply Life-Sciences learning content to solve real life problems. What is to be learned about the environment during the teaching of the Life-Sciences learning area is as follows: investigation of human influences on the environment management and maintenance of natural resources investigation of a local environmental issue problem-solving and decision making (DoE, 2003:37). According to Dass (1999:153) two strategies to be used in organizing an integrated curriculum on environmental issues is the development of students as well as the nature of the issue. He further outlined three principles for organizing curriculum around contemporary environmental issues namely:

- Exploring different aspects of the issue e.g. reasons for conservation, ways and means for enforcing conservation, as well as problems encountered in conservation.
- Exploring the connections between various aspects of the issue and the controversies involved.

- What action can and should the students take to deal with the issue at hand rely on the following questions:
 - are there personal choices they should make to change their own behavior?
 - are such changes in personal behavior important enough that the students should explain them to others (family and friends)?
 - should student action involve communicating with those in positions of authority or decision making? (Dass, 1999:153).

Biology and environmental Education can help students understand the need for working towards a balance between human activities and environmental quality (Brody1991:26). The new approach to teaching Life-Sciences learning area advocated that there should be meaningful learning in the teaching of the subject. Teachers as agents of change are the ones to plan teaching and learning in such a way that they inculcate knowledge, skills, attitudes and values which are the main principles of the OBE approach to Education. Brody (1991:26) posited that, if science educators are to adopt post modern paradigms for curriculum development such as the science, technology and society (STS) or human ecology paradigms, they must consider the multidisciplinary nature of children's conceptions of the world in which they live.

The research conducted by Ballantyne and Parker (2002:218) on nature-based excursions bred the following results: combining observation with instruction is a powerful teaching strategy. One of the most effective ways of teaching school students with an environmental message is to engage them in experiences in the environment, particularly experiences which enable them to observe the evidence of environmental problems and the impact of these on wildlife, habitats and human beings. Nature-based learning experiences allow students to apply theoretical knowledge 'in the field,' discovers real life examples of principles, problems and issues, see things in a new perspective, undertake problem-solving and decision making within a real world setting, and engage emotionally with environmental issues.

2.4 FACTORS THAT MADE THE IMPLEMENTATION OF THE CURRICULUM TO BE CHALLENGING

One of the factors that forced South Africa to change her curriculum was the demands brought by the changing needs of the society namely, new economic needs, new technological needs and new social needs. Hoadley and Jansen (2002:194) outline challenges facing the changing curriculum as follows:

- Any curriculum is embedded within a system of institutions, qualifications and so on which also require change if the curriculum is to change. In other words, one can't just change curriculum content or pedagogy, one has to change the system as whole. This is why South Africa has established a qualification authority South African Qualification Act (SAQA).- it is difficult to take a divided system, which has fulfilled different purposes, and adapt it to serve a clear and common Educational purpose for everyone. For instance if it served the purpose of creating the economic divisions capitalism requires, then one has to change the economic system too.
- The language and concepts for thinking differently about the curriculum may not be available. So the terms that are available for talking and thinking about Education and training have limiting and highly divisive meanings embedded in the old way of thinking. From the research done by Jansen (in 1998), it was discovered that teachers argued that the new curriculum was not implementable in the early part of the school year with young children because: Firstly, young children need to learn some basic principles in order to gain from formal Education. Secondly, teachers argue that the sophistication of OBE approach needs learners with a starting level competency in reading and writing to engage with this new approach. Thirdly, teachers argue that children in grade one classroom come from different backgrounds with respect to language competency, reading abilities, numerical literacy, personal confidence and mastery of early-skill routines (e.g. toiletry needs). In as far as the implementation of environmental awareness was concerned, educators did not think they had the knowledge or abilities to teach Environmental Education because of lack of training (Moseley et al., 2002:10).

According to these authors, many educators also feel ineffective at teaching Environmental Education outdoors. The above-mentioned contextual factors show that the schools (hence educators) were disadvantaged by the demands of the new curriculum. Only relatively well-resourced and stable schools in more affluent communities had the capacity to adapt with relative ease to these demands and to take advantage of the benefits of C2005 (Jansen, 1998).

2.5 CHAPTER SUMMARY

- In chapter 2 the researcher has reviewed the literature relating to the research topic namely, the integration of the environmental awareness issues in the teaching of Life- Sciences.
- Curriculum change in South Africa was discussed as well as the factors that led to such a change.
- Some guidelines for effective management of change were outlined.- A full explanation of concepts was given namely, Life-Sciences, Environment and Integration. Some guidelines on infusing environmental Education during the teaching of the Life-Sciences content were discussed.

CHAPTER 3

METHODOLOGY

The study under research is an ethnographic research case study. Such studies are usually qualitative in nature and aim to provide an in depth description of a small number of cases (Mouton, 2003:149). Ethnography means literally, a picture of the 'way of life' of some identifiable group of people (Jaeger, 1998:188). Qualitative methodology refers to 'those research strategies such as participant observation, in depth interviewing, total participation in the activity being investigated, field work etc, which allow the researcher to obtain firsthand knowledge about the empirical social world in question. Qualitative research methodology allows the researcher to get close to the data thereby developing the analytical, conceptual and categorical components of explanation from the data itself (Timothy and Bergen, 1999:30).

3.1 CHARACTERISTICS OF A QUALITATIVE RESEARCH DESIGN

Macmillan & Schumacher (1993:373), outline the following characteristics of qualitative research which make it relevant to the study namely:

Goal – The goal of qualitative research is to understand the social phenomenon from the participants' perspective. Understanding is acquired by analyzing the contexts of the participants and by narrating participant's meanings, including their feelings, beliefs, ideals, thoughts and actions.

Qualitative research is a naturalistic inquiry, the use of non-interfering data collection strategies to discover the natural flow of events and processes and how participants interpret them.

General ability is usually not the immediate purpose of qualitative research, however the understandings of peoples' experiences and concepts generalized from case studies are extended in subsequent case studies or more structured designs.

3.2 MULTIMETHOD STRATEGIES

Researchers study participants' perspectives with interactive strategies (ethnographic observation or ethnographic interview) and non interactive strategies (use of documents). Research strategies are flexible with various combination of participant observation, in depth interviews, and artifact collection. Most researchers make decisions about data collection strategies during the day.

3.2.1 Researchers' role

Qualitative researchers become immersed in the situation and the phenomenon studied. Researchers assume interactive social roles in which they record observations and interactions with participants in many situations. Scholars emphasize the importance of data collected by a skilled, prepared person rather than a single instrument.

3.2.2 Context sensitivity

Other features of qualitative research derive from the belief that human actions are strongly influenced by the settings in which they occur. In field research, one collects data over a prolonged time at a site or from individuals. Thus ethnographic research develops context-bound generalizations.

3.2.3 Sampling

The sampling problem is resolved by studying groups in their entirety that have a natural socio-cultural boundary and face to face interaction. Qualitative researchers investigate small, distinct groups such as all participants in an innovative school, all the students in an elected classroom, one principal's role in an academic year at one institution. They are typically single-site studies. Some qualitative researchers choose multiple sites with subsets of large groups.

3.2.4 Case study design

Qualitative research uses a case study design, meaning that the data analyses focuses on the 'one' phenomenon which the researcher selects to understand in depth regardless of the number of sites, participants or documents for a study.

3.2.5 Phases for data collection and analyses strategies

Qualitative phases of data collection and analyses are interactive research processes that occur in overlapping cycles. These are called procedures but data collection and analyses strategies, are techniques which are flexible and dependent on each priori strategy and the data obtained from that strategy. The study under research is a case study of the integration of environmental awareness issue in the teaching of Life-Sciences learning area in schools at Temba district. Temba district is situated in the North West province at Hammanskraal and the nearest town is Pretoria. Most schools falling under this district are in rural areas with poverty stricken communities.

3.2.6 Importance of qualitative research for this study

Since the purpose of ethnography is to provide rich descriptive data about the contexts, activities, and beliefs of participants in Educational settings, qualitative research is considered relevant to the study to investigate the experiences of Life-Sciences educators in the implementation of the new curriculum. This is because qualitative research is done in the following ways: it occurs in real life situation. It uses an epic perspective to inquire, i.e. it wishes to understand reality by discovering the in depth meaning that the people in particular context attach to it. The researcher interacts with the respondents. Respondents express themselves as freely as they wish and are not restricted or guided in responding to questions (Lebeloane 1998:84). Attempts to avoid pre judgment-goal is to try to capture what is happening, present respondents on their own terms, try to represent them from their perspectives so that the reader can see their views, always imperfectly achieved- it is quest (Cook & Campbell, 1979:34). It allows the researcher to get to close to the 'data', thereby developing the analytical conceptual and categorical components of explanation from the data itself, rather than the preconceived rigidly structured and highly qualified techniques that

confine the empirical social world is examined by requiring the researcher to interpret that real world from the perspective of the respondents (Weingand, 1993:19).

3.3 RESEACH DESIGN

The study under research uses a case study design. A case study design is seen from a methodological point of view as ‘soft options’ (De Vaas, 2001:220). This is a section that deals with the selection of respondents, how they were reached and the data collection techniques which were used.

3.3.1 Selection of respondents

Three high schools were identified for the purpose of this study and are labeled as Schools A, B, and C. All schools were selected because of their proximity to the researcher’s residence and the fact they offered Grade 10 Life-Sciences learning area. Schools A and B is situated in a rural area while school C is situated in a semi urban area. Purposeful sampling technique was applied since only schools with information rich informants were selected. To comply with the ethics of confidentiality, the names of sites as well as respondents were disguised. Six educators and three principals formed the sample of respondents I regarded as rich informants. The following criteria were used to select informants namely:

- Educators who were presently teaching Grade 10 Life-Sciences.
- Educators who attended National Curriculum Statement (NCS) workshops.
- School principals as managers of the school on how they perceive the curriculum.
- Educators with a teaching experience of 10 or more years, who could compare old curriculum with the new curriculum.

3.3.2 How the prospective respondents were reached

A letter requesting permission to conduct a research in schools at Temba Area Project Office (APO) was submitted and approved by the APO manager (see appendix 1). Subsequently a legal document was obtained from the APO (see appendix 2). This legal document was to explain to the principal that I received permission to gain entry or not. The school principals and educators still retained the right to say no.

3.3.3 Method of data collection

An ‘overt’ method of data collection was followed namely, revealing one’s identity organizing informed consent (De Vaas 2001: 246). The main method of data collection was interviews, both one on one and group interviews. Group interviews preceded one on one interview because the researcher wished to introduce herself to the respondents at a particular site as well as to get a general feeling of all respondents about the issue under study. A one on one interview followed a group interview. In this interview the researcher searched for in depth information of individuals. Two lesson observations were conducted (see appendix 3) to see how teaching and learning processes took place. Document study was done, this included Grade 10 class schedules for the year 2006. Educators’ lesson plans were observed (see appendix 4) as well as educators and learners portfolios.

3.4 ETHICAL ISSUES

During data collection processes, the following ethical issues as stated by Punch (1994:83) were considered:

Voluntary participation People should not be required or led to believe that they are required to participate in the study. Furthermore, participants should know they can withdraw from the study at any point.

Informed consent Informed consent is a close cousin of voluntary participation. Typical participants should be informed about;

1. The purpose of the study and the basic procedures.
2. The identity of the researcher and the sponsor.
3. The use to which the data might be put. They should also be provided with the following:
 - a. An outline of reasonably foreseeable risks, embarrassment or discomfort.
 - b. A description of the likely benefits of the study.

- c. A description of how they were selected.
- d. An offer to answer any questions the participants might have.
- e. A statement that participation is voluntary and that each participant is free to withdraw at any time or to decline to answer any particular question. The participants must also be assured that:
 - i. There will be no harm to respondents.
 - ii. Anonymity and confidentiality will be guaranteed.

3.5 DATA ANALYSES AND INTERPRETATION

Data analysis and interpretation followed data collection. Bogdan and Biklein (1992:113) define the analysis of data as working with data, organizing them, searching for patterns, to identify what is important and what should be learned as well as deciding what the researcher will tell them. For the sake of this study Teachers steps during data analyses were used (De Vos, A.S, Strydom, H, Fouché, C.B, Delport C.S.L,2003:34) namely,

- (1) The researcher carefully read through all the transcriptions, making notes of ideas that came to mind.
- (2) The researcher selected one interview and read it to try and get meaning in the information, writing down thoughts coming to mind.
- (3) After going through the transcripts, the researcher arranged similar topics in groups by forming columns labeled major topics; unique topics and leftovers.
- (4) The researcher then abbreviated the topics as codes and wrote the codes next to the appropriate segment of the text.

Data analysis was done in line with responses which occurred repeatedly. Such responses were grouped into four categories namely, terminology, lack of preparation in the curriculum, inadequacy of resources and learning content. After data analysis was done, interpretation of the findings by the researcher followed. Interpretation involves the synthesis of one's data into larger coherent wholes (Mouton2003:109).

The researcher's results and findings were related to existing theoretical frameworks or models and showing whether these are supported or falsified by the new interpretation (Mouton, 2003:109).

3.6 ADEQUACY AND TRUSTWORTHINESS

Data adequacy refers to the amount of data obtained and whether or not saturation occurred. Confirming the results of the study with a secondary sample can ensure adequacy of the data (Morse & Field 1992:156). Streubert Speziale and Carpenter (2003:364) describe trustworthiness as "establishing the validity and reliability of qualitative research". Qualitative research is trustworthy when it accurately represents the experiences of the study participants. Four criteria are used to measure trustworthiness of data namely, credibility, dependability, transferability, and conformability (Streubert Speziale & Carpenter 2003:39). For the purpose of this study, Guba's model of establishing trustworthiness of qualitative research would be used because it is well developed conceptually and has been extensively used by qualitative researchers for a number of years. The researcher used Lincoln and Guba's (1995:112) model, which identifies the following four criteria for establishing:-

3.6.1 Trustworthiness

- truth value
- strategy: credibility measure applicability
- strategy: transferability measure consistency
- strategy: dependability measure neutrality
- strategy: conformability measure

(Streubert Speziale & Carpenter 2003:38, Tabbot 1995:487-488). Krefting (1991:217) also discusses the above-mentioned factors to increase the trustworthiness of qualitative research:

3.6.2 Credibility

It refers to the importance of identifying and documenting recurrent features such as patterns, themes and values in qualitative research. The emphasis on recurrence suggests the need to spend sufficient time with informants to identify reappearing patterns. Credibility requires

adequate submersion in the research setting to enable recurrent patterns to be identified and verified. 'Prolonged engagement and triangulation of data methods are criteria to measure credibility. As stated in chapter 1 this study has limitations. The researcher stay was not prolonged due to the fact that the research occurred at a school and it is a case study design. The researcher however used various data collection techniques to enrich his work namely, class observations, in-depth interviews as well as document study.

3.6.3 Transferability

The difficulty with qualitative research is situational uniqueness. The particular group studied may not relate to others and hence conclusions may not be transferable. The strategy to address transferability in sample selection is the use of a panel of judges to help in the selection of informal representative of the phenomenon under study (Krefting1991:217)As stated earlier the findings of this research cannot be generalized since it is a case study. The researcher used purposeful sampling strategy to select the sample. This research will add on the existing theory and may be compared with studies made by other researchers in South Africa.

3.6.4 Dependability strategies

It is the stability of data over time and is obtained with stepwise replication and inquiry audit. Dependability criterion relates to the consistency of the findings. This means that if the study were repeated in a similar context with the same participants, the findings would be consistent. The supervisor of this study is responsible for examining the data, findings, interpretations and recommendations in order to attest that they are supported by data in this study (Clarke, 1999:532).

3.6.5 Conformability

Conformability is also referred to as 'audit ability' whereby an external auditor attempts to follow through the natural history or progression of events in a project to try to understand how and why decisions were made.

3.7 CHAPTER SUMMARY

- In chapter 3 the researcher outlined the research design she has used in the study namely, ethnographic research which are qualitative in nature. The importance of the research design for this study was discussed.
- Data collection techniques namely, in-depth interviews, lesson observations and document study were outlined.
- Research ethics employed by the researcher were discussed.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

4.1 EXPLAINING THE MEANING OF DATA ANALYSIS

Analysis involves ‘breaking up’ the data into manageable themes, patterns, trends and relationships (Mouton, 2003:108). According to Mouton the aim of analysis is to understand the various constitutive elements of one’s data through an inspection of the relationships between concepts, constructs or variables, and to see whether there are any patterns or trends that can be identified or isolated or to establish themes in the data. The methods for analyzing case study are less systematically developed than are the techniques for analyzing data collected with other types of research designs (De Vaas, 2001:249). Analysis with these other designs typically use statistical techniques that rely on having many cases and involve around comparing groups of cases. Because case study designs focus on individual cases they employ different methods of analyses. The goal of case study analyses is theoretical generalization rather than statistical generalization (De Vaas, 2001:249). Clarke, (1999: 532) outlines some characteristics of qualitative research:

- Analysis begins as soon as the first data are collected. Data analysis and data collection run concurrently and inform each other.
- The analysis process is systematic but not rigid. It continues until no new insight is being generated.
- The researcher reflects upon the data as they are collected and records initial thoughts and feelings in the form of analytical notes, often called ‘memos’. This aids the analysis process and provides a conceptual link with the data.
- Although data are divided into meaningful parts, there is a desire to maintain a sense of the whole.

- The process of analysis is based on deduction, as the categories and terminology used to describe them are derived from the data.
- Analysis involves intellectual skill and cannot be reduced to a standardized or mechanistic formula.
- While much of the work in analysis is a process of taking apart, the final goal is the creation of a larger picture.

4.2 ANALYSIS OF THE DATA

According to De Vos et al. (2003:347), once we have identified particular phenomena in data, we group concepts into categories. In this research project an in depth study of data collected from Temba district respondents was undertaken. Patterns revealed that categories could be identified. According to my analysis these were the statements that came up more often and were divided into four categories namely:

- Terminology.
- Lack of preparation in the new curriculum.
- Inadequacy of resources. Learning content.

4.3 DISCUSSION OF EMERGING ISSUES FROM THE DATA

The four categories stated above on (4.2), indicated positive and negative experiences of the respondents. The respondents were quoted to substantiate the categories resulting from the analyses of data. For the sake of confidentiality, respondents were named A, B, C, D, E & F and principal X, Y, and Z.

CATEGORY 1:

Terminology

The researcher discovered that educators were confused by the very lay out of the curriculum. The requirements for teaching looked simple in policy, but the implementation there of was not simple. Teachers were unable to teach according to the three learning outcomes namely,

Scientific inquiry and problem solving, Construction and application of Life-Sciences knowledge, and Life-Sciences, technology, environment and society. During her interactions with the respondents, the researcher discovered that educators could not interpret the terminology used in the new curriculum correctly e.g. they did not have nor understand the subject framework and the work schedule. One respondent (after he got explanation from the researcher about the meaning of the above-stated terms) commented:

I did not know you were asking me about the scheme of work. I have not yet done it . the new way of doing it is very difficult.

The researcher also asked the head of department for Life-Sciences, whether educators were implementing the NCS in the correct way. She commented: *educators and the learners cannot cope with the terminology – it is too abstract. We do not understand how these learning outcomes and assessment standards works.* Even though terminology is supposedly simplified, the new terminology still posed threat on educators. This is what was said by respondent B: *it is very difficult. Learners are empty. They cannot read nor write. They lack a background knowledge .It seems the learners did not get a good foundation.* Respondent C had this to say: *The new curriculum is difficult on the side of the learner. Learners cannot cope, they are not ready. The feeder schools seem not to be doing their work. learners come to a high school being empty.* The researcher went further to inquire whether those educators (who did not understand the policy) were doing the correct thing in the classrooms. During one lesson observation, (see appendix 3) learners were unable to understand the teacher's instruction, hence some learners were playful and were disturbing other learners.

The researcher also realized that the educator was not using the OBE approach in the teaching and learning process since the educator had no written lesson plan and she had not centered her teaching on the 3 learning outcomes of Life-Sciences. During the review of that educator's lesson, this is what she said:

It is very difficult, learners do not achieve the objectives of a lesson.

The principle of integration forms the integral part of this project. When respondents were asked if they applied the integration principle in the teaching of Life-Sciences learning area, some responded positively for an example respondent C had this to say: *That is all about the new curriculum, there is integration of different learning areas. A teacher can integrate Life-*

Sciences to LO, Maths or Economics Respondent E also indicated his understanding of what integration is all about: *Integration is possible because all subjects are interrelated* When educators were asked how they integrated Life-Sciences teaching with Environmental issues, it appeared that most educators were either not doing it altogether or they were not doing it correctly. Respondent C had this to say:

Most of the time I teach learners about Hiv/Aids because this is what is happening in their environment.

The negative response on integration was on the integration of Life-Sciences with environmental awareness. Most of the respondents did not have knowledge about environmental Education. When asked whether they linked life-sciences with the environmental awareness they answered irrelevantly: Respondent B: *NO, because of time allocation* Respondent D: *Sometimes, not always*. From the statements above, the researcher realized that integrating Environmental awareness issues during the teaching of the Life-Sciences content was not done by educators who were teaching Grade 10 Life-Sciences, because they lacked clarity.

CATEGORY 2:

Lack of preparation in the new curriculum

All respondents showed a general feeling of inadequacy of the training offered by officials from the department of Education. Most workshops were held for three days and educators were then sent to schools to implement the policy with some expertise. The situation was so intense that some educators could not even notice the changes brought by the new curriculum. The researcher realized that the department did not prepare educators, i.e. educators were not well trained to implement the NCS and thus educators' failure to do the correct thing appeared (to the Head of department) to be a resistance to change. The following negative statements were given about the workshops: Respondent A: *teachers are not ready because they are not well-trained. Teachers need a thorough workshop about the whole system* Respondent D: *The information at the workshops was not in depth, educators were not told how to infuse environmental Education in their lessons*. When educators' level of confidence was measured after they received training, this was their response: Respondent B *I cannot say I was confident, I had some hiccups on the way. Even now we are still trying. Time and again we*

have to refer. The knowledge gained at the workshop is not up to standard. For implementation it becomes difficult. Respondent A's response was: *a little bit* Respondent D said: *Not very much. Up to now I don't understand the terms of NCS* From the respondents' views, the officials who held such workshops were also ill informed. They just rushed over the policy documents without explaining other basic concepts When these educators were asked about their understanding of NCS, this is what they said: Respondent C: *When we asked those facilitators questions, they could not give us correct answers. They said they were not sure.* Respondent E: *I think right from the onset educators was not well trained and they did not teach the learners in the way the policy suggested.* Some of the respondents showed some positive attitude towards the workshops namely, Respondent F: *It has changed my way of teaching. I have realized that I should involve the learners to search for information themselves.* Respondent B: *I realized that we should employ the principle of integration. Learners should not take a particular learning area as an entity.* Due to the insufficient information received by educators during the workshops, other schools employed Non-Governmental organizations to provide more workshops for their educators, see comments by one respondent in Appendix 5.

CATEGORY 3:

Inadequacy of resources

According to the principle of clarity and accessibility stated in chapter 1 (1.1), it was the wish of the government on national unity (ANC government) to ensure that all learners have access to equal resources. From the experience by the researcher, this principle was not met. One respondent said: Respondent A: *Our school is poor; we do not have libraries where learners can search for information themselves.* The other respondent said this: Respondent B: *Most of the research projects in Life-Sciences need an internet. We do not have the computers* The researcher discovered that those educators who had some understanding about the new curriculum could not implement it with expertise due to shortage of resources namely, library, laboratory, computers hence internet as well as prescribed books. Some respondents claimed they did not have the policy documents. Lack of information resulted in the buying of books with scanty information from book sellers. respondent B *The new grade 10 textbooks have scanty information. I for one use the old grade 12 textbook plus my 16 years teaching experience.* Excursions which form an important part in environmental awareness, seemed not

to be taken very seriously in schools. Some negative response towards the undertaking of excursions was: Principal X said: *we don't subsidize excursions because our school is poor* Principal Y said: *Our school lack funds. 80% of our learners are from disadvantaged communities* Principal Z said: *We do plan excursions, but we don't succeed. Learners do not pay.* Conversely, the researcher discovered that even though excursions were not undertaken, most respondents indicated some proof of practicing some 'outdoor' teaching. They had this to say: Respondent C *when I was teaching them plant tissues (Xylem and Phloem), our school had no microscope. There were trees which were cut and I took learners outside the classroom and showed them the rings on the stem which was cut.* Respondent F *When I was teaching them photosynthesis, I made them aware of the fact that carbon dioxide is absorbed and is important in plants. Animals depend on oxygen from plants so, we should guard against deforestation.*

CATEGORY 4:

Learning content

Respondents also complained about the learning content. The year planners given in chapter 1 (1.2) showed some discrepancies in as far as the learning content of the old and the new curricula were concerned. New topics are introduced in Grade 10 syllabus with a different learning and teaching approach. The researcher also learned (from respondents) that the workshops were not about the learning content, but it was about the new terminology of the NCS. In as far as learning content was concerned, some respondents gave negative comments namely, Respondent B *The content is not easy to understand. The standard is too high for the learners. They cannot carry out instructions independently. The 'group work' thing discourages independent study and thus content is not mastered.* One of the respondents had this to say: Respondent C *I personally do not know which content to teach the learners since different textbooks contain different information.*

4.4 DATA INTERPRETATION

Data interpretation involves the synthesis of 'one's data into larger coherent wholes (Mouton, 2003:109). From the data collected it became evident that South Africa did not employ effective curriculum change and implementation strategies as stated in chapter 2(2.2).

According to Christie (1999:281), since the inception of the new curriculum, there have been difficulties because the formulation of policy was separated from its implementation. The statement above meant that the South African government was mainly concerned about bringing changes in the Education System(through policies) but had ignored the most critical feature on the management of change namely, quality and practicality of the program (Fullan, 2001: 71) in chapter 2 (2.2).

Most respondents had mentioned the fact that they lacked resources such as libraries and computers. The management of change in South Africa had some flaws when critiqued against the guidelines for effective curriculum change and implementation chapter 2 (2.2). The researcher discovered that the South African educators were not able to implement the new curriculum effectively because of abstract terminology, unspecified content and insufficient resources as discussed in 4.3 above.

The findings done by Jansen (1998:58) chapter 2 (2.2) were confirmed by this study. Educators interviewed showed a high resistance to change. There were those educators who did not do anything different from the old curriculum. Some educators used the terminology of the new curriculum in their paper work but they were still practicing the old way of teaching e.g. the educator whose lesson was observed, see Appendix 3.

Even though the educator did not have a written lesson plan the day she was observed, her educator's portfolio contained materials for NCS and some lesson plans of previous lessons, see Appendix 4. The educator's lesson was not scheduled the same date as indicated in the work schedule. The researcher got an impression that educators' portfolios were not depicting what was actually taking place in the classrooms. According to Gultig, Hoadley & Jansen (2002:8), learning programs should facilitate progression from one class, phase or learning outcome to another from any starting point in the Education and training system. The issue of progression in S.A. was threatened due to lack of good foundation, e.g. What Jansen (1998:58) observed in grade 1 classes would repeat itself in the FET band because educators are not well trained. Insufficient training of educators hindered clarity of concepts and this made educators to view the new Education System as being complex and impractical.

As posited by Jansen (1998:58), educators were not part of the policy formulation team. Ownership stated in chapter 2 (2.2) which was understood to be one of the determining factors for people to accept change, did not exist in South Africa. Jansen's (1998) report indicated that teacher formations were not part of the stake holders who discussed the new Education System. This implied that teacher formations, hence educators will not readily accept the change. The researcher discovered that integration as one principle of the new curriculum was not practiced by many educators in the sample. Those who claimed to be practicing it, did not do it correctly e.g. the educator who claimed that she took learners outside while she was teaching photosynthesis stated in chapter 4 (4.3), in addition to the fact that she indicated the importance of carbon dioxide and oxygen to both plants and animals, she could have indicated to the learners the environmental challenges posed by human interference with nature namely, deforestation, global warming and ozone layer depletion.

The failure to use Life-Sciences content to arouse environmental awareness is clear indication that educators did not plan their lessons according to the learning outcomes stated earlier on chapter 1 (1.1). Few educators had lesson plans and such lessons were not planned according to the principle of OBE (see appendix 4). Lack of understanding of the learning outcomes for Life-Sciences, especially the learning outcome number three (Life-Sciences, technology, environment and society) hindered the integration of Environmental Education with Life-Sciences content. This was indicated by the responses by respondents when they were asked about how they infused the principle of integration in their day to day teaching of the Life-Sciences content (in 4.3 above).

The researcher also discovered that the resistance to change was not only due to lack of ownership, but the researcher also realized that some educators had a feeling of loneliness (chapter 2.2). Such educators (due to lack of support) found a way to dealing with this mammoth task. They resorted to wrong methods of dealing with the content e.g. the educator who used a grade 12 textbook to teach grade 10 learners (4.3) Since grade 12 syllabi consisted of the old curriculum, this educator's action indicated that some educators are not doing anything different from the old curriculum. The skills, knowledge, attitude and values, which form the integral part of NCS, were ignored by educators.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

In this research project, qualitative research design was followed. The importance of using such a design was given. Data collection strategies were stated as well as data analysis and interpretation procedures. The study on the experiences of grade 10 educators with the integration of Environmental awareness had some limitations since this was a case study. However prospective respondents indicated that educators in general were not infusing Environmental Awareness in their teaching of Life-Sciences learning area. Educators who were interviewed indicated some stumbling blocks which prevented the teaching of Life-Sciences according to NCS. Inadequate training, lack of resources, terminology and content were among other things the most recurring factors that hindered the full implementation of the policy.

The above-mentioned obstacles promoted low self efficacy in educators who consequently resorted to a superfluous implementation of the OBE approach. Three types of educators were identified by this research namely:

Type 1

Those educators who did nothing different from the old way of teaching Life-Sciences learning area. Such educators are very resistant to change and their teaching is content based i.e. their teaching is not focused on the acquisition of skills, knowledge, attitudes, and values as stated earlier on, instead mastery of content plays the major role. The type 1 educators were similar to those discussed in Jansen's report (1998) stated in chapter 2 (2.2). From the researcher's perspective, type 1 educators did not implement the curriculum the way the policy postulates due to the four factors outlined in chapter 4 (4.3) namely, terminology, lack of preparation in the new curriculum, inadequacy of resources and the learning content.

Type 2

These are a group of educators who satisfy the paperwork requirements. Such educators had well designed work programs and lesson plans. They gave the learners more written work but their teaching style was confined to the classroom. They did employ the continuous assessment strategy of the OBE but their teaching style was still that of the old curriculum. These educators confirm the pattern 2 educators as discovered by Jansen (1998:58). Such educators were putting the blame for their incompetence to inadequate workshops provided by the department of Education.

Type 3

The type 3 educators were similar to Jansen's (1998) pattern 3 educators found in his report. These were educators who strove to implement the requirements of NCS. They did employ integration as a principle of NCS. These educators (who were a minority) were unable to fully implement the new curriculum policy due to obstacles stated in chapter 4 (4.3).

Part of the assessment tools in Life-Sciences Grade 10 is a research project. Learners could not get information from the internet because most schools lacked this facility. Educators were thus not successful in implementing the new curriculum due to factors beyond their control. The researcher realized that even though change is resistible, the reasons why educators did not comply with the demands of the new curriculum, stay outside their control. The researcher finds the Government to be responsible for all the flaws inherent in the implementation of the new curriculum. From the analysis of data done in this study, I conclude by saying that there was no proper integration of environmental awareness issue in the teaching of Life-Sciences learning area in Grade 10.

5.2 RECOMMENDATIONS

One of the stumbling blocks for the integration of environmental awareness issues in the teaching of Life-Sciences learning area was terminology as discussed in chapter 4 (4.3). Some of the respondents did not understand terms such as the subject framework, work schedule, learning outcomes and the assessment standards. As already stated, some of the respondents had these NCS documents in their files but did not implement what was in such documents (chapter 4 (4.3))

It was also stated that educators were unable to learn the terminology because facilitators themselves were not well informed. The term ‘integration’ was not explained thoroughly to educators hence educators’ inability to inculcate it during their teaching of Life-Sciences. Most respondents were able to define integration but they did not know how to infuse it in the learning content. This was probably caused by facilitators’ inability to explain how the content has to be conveyed to the learners. I therefore make this recommendation to the department:

- The department of Education must ensure that policy documents as well as educators and learner’s guides are user friendly. Simplifying the terminology would facilitate implementation of the policy. Most of the workshops attended by the respondents were for three or five days. During data collection the researcher realized that the information gained from such workshops was not adequate. Respondents claimed that after the workshops, they lacked the confidence to teach the NCS, thus:
- The department should provide more workshops for educators. They should also ensure that facilitators are well informed in order to respond correctly to the questions posed by educators. Apart from the workshops, educators should get support from subject advisors who must ensure that educators are implementing the new curriculum in the classrooms. From the respondents’ views, subject advisors are not giving educators a full support. The subject advisors visited the schools once a year and were more concerned about critiquing both the educator and the learners’ portfolios than observing what was done in the classrooms.
- I therefore recommend that subject specialists provide a continual advice to educators. Equity has been one of the principles underpinning the Reconstruction and Development Program (Gultig, Hoadley& Jansen, 2002: 91). As posited by Gultig et al. (2002:91), while the unequal distribution of material resources and quality teachers make an enormous difference to student learning, the greatest obstacle to equity in any schooling system is the differential access to formal knowledge open to different social classes. The statement above outlined the disparities that existed between rural and urban schools in as far as resources were

concerned e.g. most of the schools which were visited by the researcher (in rural areas) lacked facilities such as libraries, laboratories and computers. The researcher visited few schools in the urban areas and all such schools were well resourced. I therefore make this recommendation:

- The government must supply resources such as libraries, laboratories, computers etc. to poorly resourced schools for effective teaching and learning process to take place. The unequal distribution of resources made the government's wish to do away with the disparities brought by the apartheid regime (chapter 1.1), impractical, since during the time the research was done equity on resources did not exist in schools.

Since the educators had a problem about the content, they had to be supplied with one common prescribed book that contains sufficient information about the learning content. Educators in different schools used different textbooks. The authors of such books followed different approaches in as far as the learning content were concerned, e.g. the Oxford Life-Sciences learner book by Bezuidenhout, Clarke, Engelbrecht & Wilson (2006: 49-55) have no detailed information about the topic photosynthesis as compared to the information in the book by Isaac, Chetty, Naidoo, Manganye, Mdhuli, Mpondwana & White (2005:63-89). For a teacher with a poor insight about a particular topic, using a textbook with scanty information might offend the learners.

- Most educators do not know what to teach the learners. The learning content must be improved and stated clearly what was to be delivered to the learners. From the literature reviewed the researcher also discovered that teacher formations did not participate in the development of the new Education System, I therefore recommend that the government should first win the confidence of teacher formations who would in turn encourage their members to make NCS effective. For educators to be able to implement this new curriculum, they were supposed to get more information through part time study. Some of the respondents, though qualified to teach the Life-Sciences learning area, it seemed they did not bother

themselves to register this learning area for a more advanced knowledge. I therefore suggest that:

- The old qualifications of educators would not enable educators to implement the policy therefore there must be some in service training for educators. The above-mentioned recommendations would bring an improvement in the implementation of the policy.

REFERENCES

- Ausubel, D., Novak, J. & Hanesian, H. 1978. *Educational psychology: A cognitive view*. New York: Holt, Richard & Winston.
- Ballantyne, R. & Parker, J. 2002. *International Research in Geographical & Environmental Education*. Queensland University of Technology, Kelvin Grove 4059. Australia. 11(3) 218-229.
- Bezuidenhout, W., Clarke, A., Engelbrecht, R.S. & Wilson, B. 2006. *Oxford Successful Life-Sciences Learner book*. South Africa: Oxford University.
- Bogdan, R., & Biklein, S.K. 1992. *Qualitative Research for Education* (2nd edition) Boston: Allan & Back.
- Brody, M.J. 1991. Understanding of pollution among 4th, 8th, and 11th grade students. *Journal of Environmental Education* 22(2).
- Buckland, P. 1982. 'Curriculum reality in South African schools'. *South African Journal of Education*, 2 (4).
- Chipman, E & Brody, M. 1993 High school Biology teachers' use of wild life conservation magazines in the classroom. *Journal of EE*, 24 (2) 10-14.
- Clarke. A. 1999. *Qualitative Research: Data Analysis Techniques*. Professional Nurse: 14 (8) 534- 539.
- Christie, P. 1999. 'OBE and unfolding policy trajectories: Lessons to be learned' In J. Jansen and P Christie (Eds). *Changing Curriculum: Studies on outcomes based Education in S.A.*. Kenwyn: Juta.
- Cook, T.D & Campbell, D. T 1979. *Quasi-Experimentation: Design and Analyses Issues for field settings*. Chicago: Rand McNally

- Dass, P. M. 1999. Contemporary Environmental issues: creating curricular connections in K-12 Education. *Bulletin of science, Technology and society Journal* 19 (2): 147-54.
- De Fina, A. 1995. Environmental awareness relating to current issues in Biology. *Science teacher* 62 (6): 33-35.
- De Vaas, D. 2001. *Research Design in Social Research*. London: Sage.
- De Vos, A.S., Strydom, H., Fouché, C.B., Delport, CSL. 2003. *Research at Grassroots*. Pretoria: Van Schaik.
- Department of Education, 1995: A Curriculum Framework for General & Further Education and Training.
- Department of Education, 2000: National Curriculum Framework for further Education and training Draft document.
- Department of Education, 2003: National Curriculum statement General, Life-Sciences.
- Department of Education, 2004. FET Transition Guidelines for Life-Sciences Grade 10, 11 and 12.
- Department of Education 2005: NCS Grade 10-12 (General). Subject Assessment Guidelines, Life-Sciences.
- Education Labor Relations Council, 2003. Policy Handbook for Educators.
- Eisner, E.W. 1991. *The enlightened eye. Qualitative inquiry and the enhancement of Education practice*. New York: Macmillan.
- Elmore, R. 1981. *Backward Mapping: Implementation Research and Policy decisions*. *Political science quarterly* 94 (4):601-16.

- Evans, S. T. 1988. Man and the environment: The need for a more realistic approach to teaching ecology. *Journal of Biological Education* 22 (2):136-138.
- Fullan, M. 2001. The new meaning of Educational change. Teachers College press: USA
- Gultig, J., Hoadley, U., & Jansen, J. 2002. Curriculum: from plans to practices Reader. S.A.: Oxford University.
- Hoadley, U & Jansen, J. 2002. Curriculum from plans to practices: learning Guide, S.A.: Oxford University.
- Isaac, T., Chetty, S., Naidoo, S., Manganye., Mdhluli, B.N., Mpondwana, N.L & White, L. 2005. Understanding Life-Sciences Grade 10. S.A.: Pulse Education.
- Jaeger, R.M. 1998. *Contemporary methods: for research in Education*. American Educational research association: Washington
- Jansen, J.D. 1998. Why Education policies fail. Indicator South African Journal 15 (1):56-58.
- Jansen, J. & Christie, P. (Eds). 1999. *Changing curriculum: Studies on Outcomes based Education in South Africa*.
- Kallaway, P. Kruss, G. Faar A. & Donn, G. 1997. Education after apartheid: South African Education in transition RHT desktop: Cape Town.
- Kraak, A. 1998. 'Competing Education and Training policy discourses: A systematic versus unit standard framework. In J. Jansen and P Christie (Eds) *Changing curriculum: studies on OBE in S.A.*. Kenwyn: Juta.
- Krefting, L. 1991. Rigor in Qualitative Research: The assessment of Trustworthiness. 45(3) 214-222
- Lebeloane, L.D.M. 1998. A model for an environmentally directed teaching approach, Pretoria: UNISA.

- Le Roux, K. 2000. Environmental Education processes: Active learning in schools. South Africa: University of Natal Lincoln, Y.S & Guba, E.S. 1995. Naturalistic Inquiry. Beverly Hills: Sage.
- Lubisi, C. Parker B & Wedekind, V. 1998. *Understanding OBE: teaching and Assessing in S.A.*. Cape Town: Oxford University.
- Macmillan, J.H. & Schumacher, S. 1993. *Research in Education: a conceptual Introduction*. Harper Collins: New York.
- McLaughlin, M. 1997. "Implementation as a mutual adaptation. Change in classroom organization. In D. Finders & S Thornton (Eds) Curriculum studies Reader. New York: Routledge.
- Morse, J.M & Field D.A 1992. Nursing Research: The application of qualitative Approaches. London: Chipman & Halls.
- Moseley, C.; Reinke, K. & Bookout, V. 2002. The effect of teaching Environmental Education on preserves teachers' attitudes toward self efficacy and outcomes expectancy. Journal of EE 34(1) 9-15.
- Mouton, J. 2003. How to succeed in Masters and doctoral studies: a South African guide and resource book. Pretoria: Van Schaik.
- Newman, W.L. 1997. *Social research methods: qualitative and quantitative approaches*. Third edition. Boston: Allyn Bacon.
- Newton, C. & Tarrant, T. 1992. *Managing change in schools: a practical handbook*. Routledge: London.
- O'Donoque, R. 2000. *Environment and active NEEP guidelines for facilitating and assessing active learning in OBE*. Howick: Bharenet.

- Ornstein, A.C & Hunkins, F.P. 2004. *Curriculum Foundations, Principles & Issues*. (4th ed). USA: Pearson Education.
- Reconstruction and Development Program Document. 1994. S.A.
- Scott, W. & Oulton, C. 1998. Environmental values Education and exploration of its role in the curriculum. *Journal of moral Education*. 27 (2) 209-224.
- Solomons, E.P., Berg, L.R., Martin, D.W., & Villee, C. 1996. *Biology*. Harcourt Brace College: Saunders College.
- Streubert Speziale H.J & Carpenter D.R. 2003. *Qualitative research in nursing: Advancing the humanistic interactive*. 3rd edition. Philadelphia: Lippincott.
- Tabbot, C.A. 1995. *Principles and Practice of Nursing Research*. London: Mosby.
- The constitution of the Republic of South Africa. 1996. Tesch, R. 1990. *Qualitative research: Analysis, types and software tools* New York: Falmer Press.
- Tlhabanelo, B.B 2004. Factors impeding the Integration of environmental Education into learning areas in grade 8 & 9: A case study . Pretoria: Unisa.
- Timothy, J & Bergen, JR. 1999. Qualitative Research in Education. *Journal of Thought*, Fall . 53-60.
- Trivedy, P.R & Singh, U.K. 1993. *Global environmental Education visions of2001*. Institute of Ecology and Environment. New Dehli.
- Weingand, D.E 1993. Grounded theory and qualitative research. *Infla Journal*19 (1) 16-25.
- Woods, P. 1996. *Researching the art of teaching ethnography for Educational Use*. Routledge: London.