

**INVESTIGATING AN ENVIRONMENTAL EDUCATION
CURRICULUM TO A DEVELOPING SOCIETY'S NEEDS:
A CASE STUDY OF THE PROGRAMME OFFERED AT
THE PILANESBERG NATIONAL PARK, BOPHUTHATSWANA.**

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by

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ABSTRACT

The Environmental Education programme offered at the Gold Fields Environmental Education Centre (GFEE Centre) in the Pilanesberg National Park, Bophuthatswana, was initiated in response to requests from schools in Bophuthatswana to visit game reserves as 'syllabus related school activities'. Evaluative research into the GFEE Centre programme by an external researcher indicated that the learning experiences largely concentrated on cognitive development, and neglected to influence affective and psychomotor development.

After a number of adaptations to the programme, which emphasised a more child-centred approach it was realised that little was known about the background and learning needs of the predominantly BaTswana school children. It was felt by the researcher that the learning activities provided at the GFEE Centre could also possibly be biased by a Western, scientific orientation which possibly lacked relevance to the cultural backgrounds of the pupils.

The researcher used an action research approach in a number of workshops with a purposive sample of BaTswana primary school teachers, to gather data. The teachers were encouraged to critically reflect on the background and learning-needs of BaTswana children, with specific regard to environmental issues and worldviews. The information provided by the teachers' reflective deliberations and a separate research project with school children, indicated that primary school children in Bophuthatswana tend to follow accepted human development patterns in their perceptions of the environment. The influence of either a predominantly rural or urban upbringing during a child's early formative years was considered by the teachers to be significant in determining worldviews, and culture was considered to have an influence on children's learning processes. Their beliefs and experiences were used by them in generating suggestions to correct the GFEE Centre programme.

The teachers' also highlighted the fact that there were a number of socio-cultural and institutional issues which influenced the effectiveness of the GFEE Centre programme.

PREFACE

This study was supervised by Prof. P.R. Irwin of the Department of Education, Rhodes University, and co-supervised by Dr A. Gilbert of the Department of Psychology, Rhodes University. Dr Gilbert is a registered psychologist who primarily commented on education psychology in the research process. The researcher would like to express his gratitude for the spirit of mentorship in which the supervision was conducted.

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CHAPTER ONE

THE RESEARCH MILIEU

We will need also, if we are to build environmental studies in schools into a subject of any real depth, to rethink, or rather to put into a new perspective, what we know about young children.

Mays 1985:16

1.1 INTRODUCTION

Recent years have been characterised by an increased awareness of global environmental problems and the role that people play in creating these problems. Attention has been focused on social, economic and political processes that affect sensitive ecological systems. International concern for issues such as global warming, depletion of natural resources and the effects of poverty on the environment have been well documented (UNESCO-UNEP 1977; IUCN-UNEP-WWF 1980; Myers 1985; Allaby 1989; Praeger 1989; Weisband 1989). The World Commission on Environment and Development (WCED 1987) found that inequitable access to both resources and technology, burgeoning international poverty, uneven development and spiralling population growth are global environmental problems which impact negatively on the quality of life of many communities. Many of these issues are also of concern in southern Africa where they have been widely discussed (Fuggle & Rabie 1983; Huntley *et al.* 1989; Wilson & Ramphela 1989).

Some of these problems relate to the conflict between developed and developing countries about the inequalities in resource utilisation, access to technology, global distribution of wealth and educational processes (Agarwal 1986). When considering such problems in developing societies of Africa, Okot-Uma & Wereko-Brobby (1985:142) however argue that it is simplistic to blame all such problems on foreign influences, and that in many instances the problems can be attributed to the actions and directions of the indigenous intelligentsia who "sought to promote the imposition of a concept of development that is divorced from the socio-cultural environment."

Bophuthatswana may be classified as a developing society within southern Africa based on economic parameters (Gross National Product) used by the World Bank (Cole 1987) or the 'modernity model' which uses the level of industrialisation, institutional specialisation and level of liberal democracy as a yardstick (Kotze 1983). It was in this context that the researcher felt that Bophuthatswana might experience some of the environmental problems that are found in developing countries such as India (Agarwal 1986) and many Africa countries (Okot-Uma & Wereko-Brobby 1985). Population growth, deforestation, reduced land productivity and reduction in wildlife populations are a few examples of such problems.

The scope and nature of environmental issues impacting on people's quality of life today require that people be aware of the consequences of any possible threats to their wellbeing. This point is eloquently made by Brundtland in her introduction to the report on the World Commission on Environment and Development (WCED 1987:xiv):

If we do not succeed in putting our message of urgency (regarding environmental threats) through to today's parents and decision makers, we risk undermining our children's fundamental right to a healthy, life-enhancing environment. Unless we are able to translate our words into a language that can reach the minds and hearts of people young and old, we shall not be able to undertake the extensive social changes needed to correct the course of development.

Environmental Education may be just such a process which can facilitate relevant social change and Walsh (1984) contends that it is an important component in helping to solve international environmental problems that exist and which were foreseen in the future.

The role, objectives and characteristics of environmental education were formulated at the world's first Intergovernmental Conference on Environmental Education, held in Tbilisi in 1977. The conference recommended the adoption of a number of principles (Appendix A) and criteria to help guide national environmental education efforts (UNESCO-UNEP: 1978). Some of the criteria relate to the process of assisting people to understand the complex nature of the environment, and to help them acquire the knowledge, values, attitudes and practical skills which could be used in solving environmental problems. The conference suggested that to achieve this environmental education should bring about a closer link between educational processes and real life, "building its activities around the environmental problems that are faced by particular communities" (UNESCO-UNEP: 1978:2).

Okot-Uma & Wereko-Brobby (1985:141) in discussing the role of environmental education in Africa, suggested that "the environment is a natural starting point for any kind of education in society. It provides a context, a perspective and a scope for varieties of learning experiences." It was this link between cultural and environmental elements that contributed to the formulation of the aims of this research.

Taking the above considerations into account, this case study describes the environmental education programme offered at the Gold Fields Environmental Education Centre (GFEE Centre) in the Pilanesberg National Park, and the use of an action research process to adapt it to the needs of the communities it serves. The programme provides environmentally orientated learning experiences to BaTswana children primarily, where the environmental education teachers are encouraged to use internationally accepted environmental education approaches.

The researcher has been involved with environmental education as a function in the Bophuthatswana National Parks Board (B.N.P.B.) from 1985, with the development of the policies and strategies (Appendix B), through to the development and monitoring of programmes. Throughout the period of this research he also managed the environmental education function within the B.N.P.B., which included the Gold Fields Centre.

Preliminary analysis of the programme by the researcher during 1988, suggested the possibility that the environmental education approach used at the Gold Fields Centre was flawed in that it was teacher-centred, cognitively based and that the context of some of the learning situations was inappropriate for the group of children which it served. These possibilities prompted the researcher to submit the programme to critical scrutiny and evaluation by a group of school-based teachers working in collaboration with the Centre's teachers.

1.2 THE AIMS OF THE STUDY

The aim of the research was to analyse the content of the programme and the teaching approaches used at the GFEE Centre, and the relationship of these to the learning needs of

BaTswana primary school children who visited it, in the context of Bophuthatswana as a developing society. This focus flowed from the declared policy (B.N.P.B. 1986) and stated strategies (B.N.P.B. 1987) of the Bophuthatswana National Parks Board, relating to Formal Environmental Education (B.N.P.B. 1987:4). Strategy 2.2 stated specifically:

"Our teaching aim should be to build upon what course and programme participants already know as well as to introduce new concepts and experiences and to influence attitudes."

No previous formal research had been conducted by B.N.P.B. staff to determine what the children visiting the GFEE Centre 'already knew' despite the policy and strategies requiring this. Rudimentary and uncoordinated attempts had been made by individual teachers at the Centre to survey pupil's knowledge and understanding of environmental subjects on an informal basis but these were not documented. Initial analysis of the situation by the researcher, suggested that Western approaches to teaching might not optimise the scientific and environmental learning experiences offered at the Gold Fields Centre programme.

The researcher intended to obtain more detailed information from school-based teachers on their perceptions of children's understanding of current environmental issues, before a more intensive research might be carried out directly with children. It was assumed that the teachers together with the researcher, could identify what content should be taught and which teaching approaches were best suited for use with their pupils.

The specific goals of the research were:

- a) To investigate practising teachers' perceptions of environmental issues relevant to the worldviews of standard 3 and 4 pupils in Bophuthatswana;
- b) To use those perceptions as a basis for developing appropriate programme content and teaching approaches for the Gold Fields Centre which would conform to environmental education principles.

1.3 ENVIRONMENTAL EDUCATION IN PERSPECTIVE

The internationally recognised principles and outlines of environmental education are contained in the Belgrade Charter of 1975 (UNESCO-UNEP 1976) and the Tbilisi

Declaration of 1977 (UNESCO-UNEP 1978), using the following definition:

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 man, his culture and his bio-physical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality (IUCN 1970).

This definition together with these principles have been used by the B.N.P.B. to guide its environmental education policies (BNPB 1986)(See Appendix B) and programmes. A description of environmental education which has particular relevance to this study is that of Rejeski (1984:38) who promotes a child-centred approach:

When we speak of environmental education we are speaking of a special preparation which will give the child an objective sense of how the natural world functions as a whole and of his responsibilities as part of this natural order. The goal should never be to diminish the child's sensible fascination with nature, just to add other dimensions of knowing it.

Many educators have proposed that the ultimate goal of environmental education is the promotion of responsible environmental behaviour (Roth 1970; Stapp & Cox 1974; Hungerford & Peyton 1976 as cited in Sia *et al.* 1986; Stapp 1978). Despite this, Sia *et al.* (1986) observed that the teaching approaches of most environmental educators focus on awareness creation and the analysis of environmental problems, rather than on attitudinal or behavioural change. They indicated that the reason for this misdirection could be due to a "... lack of knowledge of those factors which influence the development of environmentally responsible behaviour." (Sia *et al.* 1986:3). This study may therefore contribute to providing some insight into what knowledge and understanding is needed for effective environmental education in a developing society such as Bophuthatswana.

1.4 THE PILANESBERG ENVIRONMENTAL EDUCATION PROGRAMME

1.4.1 Development of the environmental education programme

The B.N.P.B. has provided environmental education programmes at the Pilanesberg National Park since May 1981 (Hancock 1986). The programme started with simple outdoor lessons which largely supported the 'environmental science' or ecological elements of a school's syllabus (Irwin 1987; B.N.P.B. 1987) and essentially conformed more to the concepts of

'conservation awareness' or 'conservation education' (Irwin 1981:10) than to environmental education. Mahape (1988) considered this ecological emphasis to be a response to the increased significance placed on ecology in the school syllabi of Geography, Biology, General Science and Agricultural Science in Bophuthatswana after its nominal independence in 1977. Many teachers untrained in ecology and unfamiliar with the principles and issues relating to it, looked to the Pilanesberg staff and programmes for help and guidance (Mahape & Irwin 1988:19).

Over the duration of the research, each programme at the Gold Fields Centre covered a twenty four hour period, where the schools arrived at lunchtime on a day and left just before lunch the following day. The programme usually followed a format in which the children, upon arrival, received an introductory lesson about the Park and the conservation approaches used in it. Lessons were given covering the basic elements of ecology including the concepts of natural resources, food-chains, food-webs, and the relationships between organisms and their bio-physical surroundings.

Through observation and analysis of actual teaching sessions at the GFEE Centre, the researcher found that Western approaches to teaching were used, with expository processes of teaching (Brady 1985:16) predominating. This behaviour could possibly have related to the inclination of teachers to 'teach how they were taught at school, or to the teaching styles taught to them in the Colleges of Education. Observation of game-drives and bush-walks, which were intended to expose the children to more experiential types of learning, showed that teachers invariably used expository modes of teaching due to the large size of groups (30 children) which they had to manage.

Films and slide shows were used to reinforce concepts taught during the lessons, though many of these films used examples of animals, plants and situations from other countries which pupils were unfamiliar with. The narration on the films was also found to be difficult for the researcher to understand due to foreign accents, leading him to conclude that the films were even more difficult for children to understand, especially where English was not their mother-tongue. The films were also found to be inadequately related to practical examples during field-work (Mahape & Irwin 1988:21).

Over 75 000 children participated in the environmental education programme at the Centre during the period 1982-1990, of which the majority were standard 3 and 4 pupils. It was a strategy of the B.N.P.B. to encourage standard 3 and 4 school groups to visit the Gold Fields Centre, due to the links between the environmental education programme and the Department of Education's syllabus for these standards (B.N.P.B. 1987:4). Another reason that standard 4 children were targeted was because a school-leaving examination was written at the end of standard 4 and in some cases it was a last opportunity to reach the potential school-leavers. Many primary schools were also known to have very few teaching resources, and so the GFEE Centre programme was seen as a support service to the teaching of the standard 4 syllabus.

An environmental education extension service (Monchusi & Hancock 1986:11) which visited schools was developed by the B.N.P.B. in 1981 to follow-up and re-enforcement the educational programme that schools experienced at the GFEE Centre. The Extension Officers or 'Film-van Operators' as they were called, interacted with teachers and provided advice and information, as well as teaching pupils via films and lessons. An extensive conservation club movement was started within the Bophuthatswana school system in 1983 (Hancock 1986) with the intention of spreading "interest and knowledge about conservation and the environment among the people of Bophuthatswana" and to stimulate active involvement in conservation (Rammutla & Motaung 1987:9).

1.4.2 Creating a more focused approach

During 1985 an Environmental Education Committee was formed by the B.N.P.B. to guide the environmental education activities within Bophuthatswana in a more focused way (B.N.P.B. 1985). This committee formulated an Environmental Education Policy with its Key Objective being:

....to enable the people to develop, through appropriate education, a national sense of environmental awareness, which is behaviourally affective in conservation terms, and which satisfies the identified needs of Bophuthatswana.

(B.N.P.B. 1986)

Within this policy the various categories or functions of environmental education were defined. The formalised or structured approach termed 'Formal Environmental Education' was described as "...all the planned educational activities ... operated for school pupils, teacher trainees and other situations where the audience is involuntarily present." (B.N.P.B. 1986:3). The two other major environmental education functions undertaken by the Board were Interpretation and Extension Services, which related to informal environmental education activities in parks, conservation clubs and film-van activities.

Strategies developed to guide the implementation of Formal Environmental Education included the following:

Courses, programmes and content should reflect an appropriate balance between the Cognitive, Affective and Psychomotor domains. Management of courses and programmes must be flexible and conducted in such a manner that teacher-pupil interactions are optimised in terms of children's needs, staff specialization and efficiency.

(B.N.P.B. 1987:3)

The Environmental Education Committee, in addition to its regular members, had the assistance of a group of external consultants made up of 3 active environmental education specialists within southern Africa. This group provided an external perspective on the B.N.P.B.'s environmental education activities.

The standard 3 and 4 programme offered was developed in response to the needs indicated by the teachers from the schools visiting between 1982 and 1987 during which time in-house evaluation was carried out on a limited basis through the administration of a 'post-visit' questionnaire to accompanying teachers. Through this feedback the programme was evaluated, adapted and developed in response to a growing public awareness created about local and global environmental problems.

Research by Mahape (1988) into the effectiveness of the educational efforts at the Centre up until 1987, as reported by Mahape & Irwin (1988), highlighted some deficiencies in the courses offered, the most significant of which were:

- although some cognitive aspects of conservation were being covered adequately ie. definition of habitat, the development

of insight and understanding of other important concepts such as 'food chains' was limited;

- a large proportion of the children (62%) indicated that they would only use the knowledge and understanding gained at the Gold Fields Centre back in the school situation - thus indicating that the course had not succeeded in instilling in them an overall need to adopt a responsible attitude or behaviour to their environment;
- the children's understanding of ecological processes, with specific reference to the concept of 'interrelationships' was not significantly demonstrated, despite seventy-five per cent of the children having covered the concept in school, and having completed the GFEE Centre programme.

These issues were used as a catalyst to initiate an overall review of the programme, and to introduce improvements which would attempt to meet the criteria set by the B.N.P.B.'s Policy (B.N.P.B. 1986) and Strategies (B.N.P.B. 1987).

The researcher considered that the problems identified by Mahape (1988) could be related to two closely linked issues:

- Institutional constraints such as teacher/pupil ratios, group booking procedures and late or non arrivals which placed pressure on teachers and adversely effected learning situations;
- Educational issues which affected the teaching practices and effectiveness of teachers.

The institutional constraints were addressed with some success, and are commented upon in Section 4.2. The pedagogical issues were considered to require further study and are the primary substance of this thesis.

1.5 THE STRUCTURE OF THIS CASE STUDY

Having considered the possibility that the environmental education approach used at the Gold Fields Centre was flawed in that it was teacher-centred, cognitively based and that the

learning context was possibly inappropriate for the groups of children which it served, the researcher decided to study the issues further.

It was decided that standard 3 and 4 Batswana children's perceptions of environmental issues should be investigated to see if the environmental education programme at the GFEE Centre could be improved. It was planned to elicit the aid of school-based teachers and their knowledge of BaTswana school children to achieve this.

This case study has been organised into six chapters which describe the research process undertaken. The chapters that follow are therefore:

- Chapter Two - A review of the literature that relates to key concepts used or encountered within the theoretical framework of the study;
- Chapter Three - An outline of the methodology used in the study is discussed showing how an action research process was seen to be most appropriate for the circumstances;
- Chapter Four - An account of the chronological action research undertaken with appropriate comment on the various issues that arose from the process;
- Chapter Five - An in-depth analysis and discussion of the information and data described in Chapter Four, together with reflection on the various issues that have a relationship to the aims of the study. An analysis of the various strengths and weaknesses of the study is also made at this stage;
- Chapter Six - A synthesis of the views and deductions arrived at by the researcher regarding teacher's perceptions of BaTswana children's worldviews and comment on the relevance of the teachers' perceptions to environmental education curricula in developing societies.

For ease of reference a diagrammatic outline of the complete research process is given in Figure 1.1.

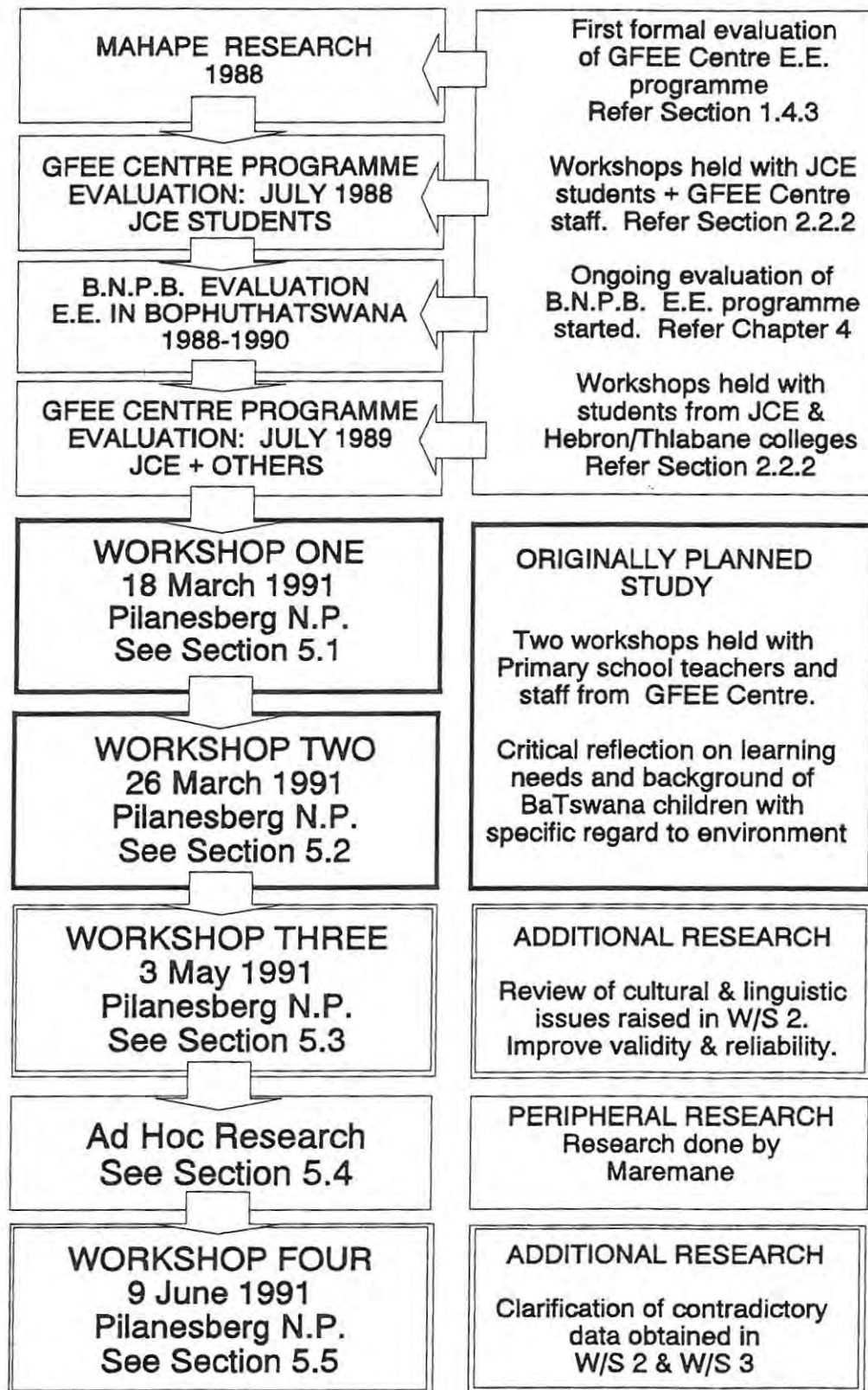


Figure 1.1: Outline of research process and preliminary work

CHAPTER TWO

LITERATURE REVIEW

While environmental education is concerned with the biophysical environment and its associated problems, it is ultimately concerned with man, for you educate people not environments.... Thus, an environmental educator must have not only a basic understanding of the environment, but also a basic understanding of man. Any theory of environmental education, therefore, must rise from the fusion of these two bodies of knowledge.

Swan 1974

2.0 INTRODUCTION

Environmental education is a broad concept which has roots both in the natural sciences (Mays 1985) and the human sciences (McNiff 1988). Within the human sciences it is linked to educational psychology (Mays 1985) and sociology. In this chapter relevant areas of literature are reviewed to orientate this study within the wider sphere of educational and environmental research. A survey of literature on curriculum issues was also carried out to assist in developing an appropriate syllabus suited to the particular needs of Bophuthatswana's context.

2.1 SPECIFIC ASPECTS OF LEARNING IN ENVIRONMENTAL EDUCATION

A review of environmental education literature indicated that the concepts of attitudes and values feature prominently (Rejeski 1984; Okot-Uma & Wereko-Brobby 1985; Ballantyne & Oelofse 1988; Irwin 1991), often being seen as key issues. Studies of learning processes also indicated that the role of *perception* in environmental education (Goodey 1973; Knamiller 1981) was regarded as being important.

A degree of confusion exists however, regarding the meaning of the concepts of attitudes and values. Fishbein and Ajzen (1975 as cited in Blum 1987) saw that the terms beliefs, opinions and attitudes are often used synonymously, whilst Gagne (1977:226) noted that values and attitudes were often spoken about "in the same breath." Richmond and Morgan (1977) and

Gagne (1977) made the assumption that beliefs and attitudes were related. Schreuder (1990) on the other hand has likened perceptions to beliefs, confident opinions, or dispositional influences. Values were seen by some researchers (Reich & Adcock 1976 as cited in Schreuder 1990) to be less specific than attitudes and were therefore less easily detected in behaviour patterns.

Perceptions were also considered to be linked to feelings when forming concepts (Read & Patterson 1980), relating the concept not just to the cognitive domain but to the affective domain as well. This argument was supported by Eisner (1982) who contended that perceptions are a "cognitive event", and that "there can be no affective activity without cognition". The significance of this relationship for environmental education was noted for its essential role in the development of curriculums and educational activities.

2.1.1 Values

A number of definitions and principles of environmental education (IUCN 1970; UNEP 1977) referred to values and values clarification, in the context of developing appropriate and responsible behaviour towards the environment. Giddens (1989:732) explained that 'values' imply some element of moralistic judgement - "Ideas held by individuals or groups about what is desirable, good or bad." Rath *et al.*'s (1966) view included a concept of personal commitment and development, "a value is a belief that one has chosen freely from alternatives; that one is prepared to act upon and live by; and that one regards as enabling one to enhance one's well-being, one's development as a human being."

Schreuder (1990) commented that values and social norms were not necessarily synonymous, although he did indicate that a close relationship existed between the concepts, and quoted Rokeach (1973:19) in support of this - "...values, as standards for establishing what should be regarded as desirable, provide the grounds for accepting or rejecting particular norms."

2.1.2 Attitudes

Many references to environmental education include the need for people to acquire responsible attitudes towards the environment (UNESCO-UNEP 1978; Okot-Uma & Wereko-Brobby 1985; Irwin 1988). A common element that tied together the varying definitions of 'attitude' appeared to be 'a readiness to respond' (Rokeach 1968; Reich & Adcock 1976 as cited in Schreuder 1990). Triandis (1971:2) introduced an aspect of emotion into the concept, and defined an attitude as "...an idea charged with emotion which predisposes a class of actions to a particular class of social situations," whilst Reich and Adcock (1976 as cited in Schreuder 1990) claimed that the action is predisposed to an evaluative response. McInnis & Albrecht (1984 as cited in Schreuder 1990) gave a fuller interpretation of the concept with their claim that there are three components to an attitude - knowledge, feeling and an action tendency.

A more eclectic view of attitude given by Fishbein and Azjen (1975 as cited in Blum 1987) includes four elements: *affective* components such as feelings; *cognition*, including knowledge, beliefs and opinions; *conation* - a conscious drive to perform willing acts; and *actual behaviour* itself. For the purposes of this study therefore, attitude may be seen as a combination of a persons's feelings, knowledge, beliefs, and opinions together with actual and intended actions.

2.1.3 Perceptions

Research into the development of cognitive and affective attributes shows that perception plays an important role in learning processes. Mays (1985:24) however argues that although there are a plethora of research works on the psychology of learning, socialisation processes, human development and educational approaches, there "is no universally accepted theory of cognition, no theory of perception, but many theories of personality and that the fragmented state of the research denies us a clear perspective."

A review of the concept of 'perception' showed that it is a complex field of study (Goodey 1973), which had been extensively debated in philosophy (Ayer 1973; Ozmon & Craver 1986). It has also been extensively discussed in educational psychology by eminent researchers such as Piaget (Piaget & Inhelder 1967), Wertheimer, Koffka and Kohler (Slavin 1991).

A link between perception and the creation of meaning was acknowledged in the literature covered (Capra 1983; Moroni & Ravera 1984; Hewson 1988). The researcher's review of the literature led him to make the distinction that there are essentially two ways in which the concept of perception may be used:

- *in a technical sense*: in terms of how a person relates to objects or phenomena through the senses - sight, touch, smell, hearing,; or,
- *in a universal sense*: in terms of how people look at the world in an everyday manner - how they understand something through the process of integrating new information with old, e.g. environmental perception implies the way in which people understand and see the environment, or how they make *sense and meaning* of their world and how they understand their relationship to/with the physical world around them.

For the purpose of this study, the researcher has concentrated on the 'universal' concept of perception as this related more directly to the parameters of the research.

The importance of perception in the teaching of environmental education is stressed by Mays (1985:7) who argues that "Quite clearly, environmental studies, and indeed teaching of any sort, are not going to be very meaningful if teachers and taught have very dissimilar perceptions of reality." To place this argument in perspective she defines the 'reality' of the environment as being "everything that is outside ourselves, including, in a subtle way, individuals themselves. It (also) includes not only the physical phenomena but people, culture and ideas as well" (Mays 1985:15).

The *Gestalt* theorists (Kohler, Koffka and Wertheimer) contended that perceptions are "influenced by the way stimuli are arranged, and that they are also influenced by past experiences and present interests" (Biehler & Snowman 1982:247). The uniqueness of

people's experiences and their structuring of reality influences their perceptions, and they in turn are involved in the formation of concepts and the development of behaviour patterns (Read and Patterson 1980). Perceptions were therefore viewed by the researcher as being 'constructed', where a person is able to choose which environmental stimuli should be attended to, and how they will be responded to, and on that basis use perceptions in adding to knowledge, developing concepts or influencing behaviour (Eisner 1982). The researcher also felt that this constructive process is a major factor in the development of people's worldviews.

2.1.4 Worldviews

Goodey (1973:2-3) in his discussion of the many types of perception commented on *social perception* as being:

...the perception of space and of features of the environment... and ... the way in which perception relates to both external stimuli and to inner feelings and drives, to the stored experiences of the past, and to cultural and group attitudes.

He cautioned that perception should be seen as a dynamic process which changes continuously as an individual moves through time and space. An important point outlined by Goodey is the holistic nature of perception where people do not sub-divide their observations into disciplinary categories, but view the "totality out there" - a totality which may be likened to a person's more comprehensive view of his or her 'world'.

A description of a worldview which the researcher felt complimented Goodey's (1973) outline of social perception, was that given by Sterling (1985:198) as:

... the frame of reference by which they (we) perceive and act upon reality... a coherent set of basic assumptions, views and beliefs about how the world works, what it is and how members of society should interact with it.

Sterling (1985) also links his concept of a worldview with culture, suggesting that culture provides the foundation for a particular worldview. Because culture is viewed as being a constantly changing process (Giddens 1989), it can be inferred that Goodey's (1973) argument supports Sterling's in concluding that worldviews should also be seen to be

dynamic and changing in structure. Mays (1985:16) supports this opinion with special reference to a view of the environment:

The environment changes as the individual grows older; it is not constant and it is not a stable entity. The two-year-old lives in a different world from that of a nine-year-old, whose world is, in turn, not the same place as that of a fifteen-year-old.

The primary areas of concern identified in the Gold Fields Centre environmental education syllabus indicated that there was a need to obtain clarity on the **environmental issues** that relate to the worldview of a typical Standard 3 and 4 BaTswana child.

Piaget's developmental theories which comment on the worldview of very young children who initially have 'egocentric' viewpoints which are later 'de-centred,' are considered by the researcher to be important in the development of effective environmental education learning experiences (Donaldson 1978).

Using Goodey's view of social perception and 'totality' described above, the researcher defined the term 'worldview' within the context of this research as:

the way in which a person views the world at large based on the *meaning and understanding* that he or she *individually* constructs from all existing knowledge, skills, emotions, values, attitudes and perceptions together with the results of these being assimilated with, or modified by new internal and external influences.

In this description the 'world at large' includes - the very narrow limits relating to mother and home of a pre-school child; increasingly wider horizons of neighbourhood in early primary school children or the more global comprehension of adolescents and adults.

2.1.5 Language

The role of language in the process of learning was recognised by the researcher, to be instrument of thought and internalisation (Bruner 1966) within cognitive development (Wadsworth 1978; Brady 1985). Bruner (As cited in Brady 1985:104) places "more

emphasis on the role of language in cognitive development than does Piaget", with Bruner claiming that "thought is internalised language." Piaget however theorises that language adds significantly to, and is "instrumental in the development of the child's power of thought" (Wadsworth 1978:69).

Macdonald (1990b) found that language had a great influence on learning outcomes - especially where second language teaching occurs. This has great relevance in Bophuthatswana where English as a second language is used as the medium of instruction from Standard Three onwards. Not all children are adequately prepared for the transition from mother-tongue to English in Standard Three, where the second language may not have equivalent concepts to the mother-tongue (Van Rooyen 1990). Swart (1989:178) considered that children's level of ability in a second language would be particularly important during this transition within a developing society's context. He observed that, "In the child's conception of natural phenomena and science, it is important to note that, the meanings as discovered by the child and chained to his language will play an important role in his further discovery of meaning." The influence of language on any learning processes used in environmental education therefore needs to be researched further.

Although the topic was briefly investigated by the researcher, the complexity of the issues involved and the depth of discussion needed to accommodate it adequately in this research, was not justified for the level of this study.

2.2 CHILDREN'S PERCEPTIONS OF THE ENVIRONMENT

Stapp (1978) asserts that attitudes towards the environment are generally acquired very early in life, indicating to the researcher that greater emphasis should be placed on this in a child-orientated environmental education syllabus.

Contrary to the developmental theories of Piaget, where children are seen to develop a view of the world in a progressive manner, Matthews (1985:228) claims that "environmental knowing.... is keenly developed from an early age" and is not necessarily progressive. This alternative argument was supported by Mays (1985) who argued that in the context of a

natural environment, perception is the basis upon which the environmental strategies of the young are built and that they may develop complex views about the environment with limited stimulation (Mays 1985).

A significant amount of research on people's *attitudes to*, or *knowledge of* environmental issues was found to have been undertaken throughout the world (Adams *et al.* 1986; Culen *et al.* 1986; Sia *et al.* 1986; Benayas *et al.* 1987; Blum 1987; Dolin 1988), some of which related to developing countries (Knamiller & Obeng-Asamoah 1979; Parker 1984). Much of this research was directed at children. Parker (1984) found though, that prior to 1984 little research was carried out regarding children's perception of their environment.

The literature search also indicated that there had been very little research carried out in southern Africa with regard to children's perceptions of the environment. Only three works of direct relevance to this study were located, those being Irwin's (1982) research involving white adolescents in Natal, Parker's (1984) work in Zimbabwe, and Schreuder's (1990) study of children in the Cape Province.

Parker's research in Zimbabwe indicated that "...many areas and items within the physical environment of township children are perceived as significant. These include natural and man-made components of streets and yards." She described her research amongst twelve year old pupils in townships as trying to establish amongst other issues:

- What outdoor physical features pupils are aware of.
- What knowledge they have of these.
- What importance they attach to these.
- What attitudes they attach to the quality of these.
- What knowledge they have of the whereabouts, availability, and use of physical resources in their environment.

She further commented that information about the above issues could provide useful guidance to syllabus developers in environmental education, and also in motivating a starting point for teaching (Parker 1984). The results of her research showed that the categories of food, 'the yard' and wild animals were shown to be significant contextual elements in the perceptions of the children studied.

A comparison of the similarities and/or differences between the environmental perceptions of children in developed societies and developing societies was not found in the literature. A comparison of environmental beliefs between children of different developed countries was however conducted by Blum (1987) in which he concluded that the children had similar levels of knowledge and beliefs on environmental matters.

2.3 TEACHER'S PERCEPTIONS OF THE ENVIRONMENT

Isolated studies on the *knowledge level* of teachers about the environment were found to have been carried out throughout the world, although no specific research into teachers' *perceptions* of the environment' was found. The amount of research into teachers' environmental knowledge was found to be limited in a literature search by Hooper (1988), and where such studies were made teachers were seen to have low levels of environmental knowledge (Ferrier 1972 and Bueth 1975 - as cited in Hooper 1988:15).

Irwin (1982:50-51) noted that the state of environmental awareness amongst southern African teachers was not determined, though it was likely to differ across the "...spectrum of culture, race and socio-economic circumstances." He also argued that the difference in perceptions of the environment between teachers could be expected to vary widely, depending on their educational qualifications, community background, age, gender, level of affluence, and experience. Hawes (1979) had also commented on such differences in perception in his discussion of teachers in ten English-speaking African countries.

Research into American teachers' understanding of wildlife management concepts by Hooper (1988), showed that teachers had a number of misconceptions about wildlife management processes, which were being passed on to their pupils. Personal observation and experience by Irwin (1982; 1988) whilst researching environmental education in southern African, showed that teachers, and especially those in primary schools, often lacked an understanding of environmental processes. Many teachers found the concept of the environment and its relationship to ecology to be threatening because of their complexity.

Relevant experience or a lack of it could be an important consideration in determining teacher's perceptions of the environment. Brandt (1986) in his analysis of factors which produced 'superior teaching', found that the need to 'act upon insight stemming from experience' was a significant ingredient. A lack of direct experience relating to ecological issues could create tension within teachers resulting in the perception that environmental issues are a complicated and threatening topic to include in learning situations.

The researcher was unable to trace any specific references, literature or research which has been carried out, on southern African teacher's perceptions of the environment. A few reports on recent attempts to gauge the level of environmental awareness of specific professional groups such as ecologists and businessmen in South Africa were found (Preston *et al.* 1989), though it was felt by the researcher that these studies are of marginal relevance to this research due to the significant difference between those sample populations and the sample populations of this study.

Odendal (1988) in his research in KwaZulu gave an indication of the environmental perceptions that the Zulu people might have. Although Odendal felt that the Zulus do not attach the same meaning to species of animals as is generally found in people from developed societies and that they place a minimal emphasis on the aesthetic value of the environment Butler-Adam (undated) criticised Odendal's research arguing that there were fundamental problems relating to underlying racist assumptions and serious methodological problems both of which render its findings questionable.

2.4 CURRICULUM DEVELOPMENT AND ENVIRONMENTAL EDUCATION

2.4.1 Aspects of curriculum theory

An analysis of the literature on curriculum development shows a diversity of thinking on the subject (Hawes 1979; Pratt 1980; Horton & Raggatt 1982; Beane *et al.* 1986). Reid (1990:206) observes that the term curriculum is treated as a universal concept, though "actual discourse about it is, inevitably particularistic and has ... specific actions within specific contexts". The review showed that most educational institutions attempted to provide a wide

range of learning experiences according to some pre-determined goals or plans which could be termed a curriculum (Pratt 1980; Oakeshott 1982; Sykes 1982; Taba 1982; Kemmis 1990). The failure of many such planned approaches has been acknowledged by researchers (Papagiannis *et al.* 1982; Grundy 1987), as a result of Stenhouse's (1975) initial revelation of the flaws in the traditional Tyler (1949) model. Stenhouse (1975:2) stated the case clearly:

In essence it seems to me that curriculum study is concerned with the relationship between two views of curriculum - as intention and as reality. I believe that our educational realities seldom conform to our educational intentions."

Investigation by the researcher showed that it would appear that much of the existing education that continues to take place through 'western' educational approaches today is based on a behaviourist approach to the curriculum, where authoritarian processes prevail (Hawes 1979; Macdonald 1990a; Christie 1991), often with few links to the reality of the learner's home background. The student, and often teachers too, are largely passive players in the design of educational systems, and submissively comply with the dictates from above (Davies 1971). Deterministic approaches are still widely endorsed, as shown in the results of an empirical survey done by Adams *et al.* (1986) in America, to determine student's attitudes and perceptions to wildlife. In their summary they state; "Thus the need for active, well planned, targeted educational programming on the natural environment and it's endemics (sic), emerges as one of the most important areas in curriculum development today" (Adams *et al.* 1986:267).

A behaviouristic approach to education was problematic to Stenhouse (1975) due to the possibilities that exist for education to become merely a 'means to an end'. He rather proposed that it should be seen in a more flexible, non-deterministic 'process' and offered a tentative definition of the curriculum as being: "... an attempt to communicate the essential principles and features of an educational proposal in such a form that it is open to critical scrutiny and capable of effective translation into practice."

Stenhouse developed the 'process model' of curriculum design as an alternative to the 'behavioral' model (Elliot 1982). Elliot (1982) supported this 'process' approach, with its

participative classroom-based research centred on dialogue, where participants have the freedom to put forward, call into question, and give reasons against statements, explanations, interpretations and justifications.

Knamiller (1983) in his research on curriculum development advocated a closer association between school and the child's home situation, in order to create a degree of relevance for the learner and thereby bridge the gap from the known to the unknown. This was often found by Hawes (1979) to be a difficult process where some communities saw the modern education process separated from everyday social life. The formal school remained separate from the community it served, very largely because the people in that community wished it to be so. Hawes also considered the use of a second language for the medium of instruction to be the possible cause of this dilemma. This was also the view of Thirion (1989a) in South Africa.

2.4.2 Some curriculum issues in southern Africa

Ballantyne and Oelofse (1989) commented specifically on curriculum development in South Africa, highlighting that the process was centralised in the Joint Matriculation Board, which served to define and constrain the content to be taught. They also noted that the process of syllabus construction and the subject-based nature of the school system led to the compartmentalisation of knowledge. These approaches both at a macro planning level and their effects on teachers at school level, have important implications for the development of effective environmental education curriculums (Ballantyne & Oelofse 1989), where such reductionism is in conflict with the holistic nature of environmental education. These effects were relevant to this study, in that it is from such an historical background that the researcher was attempting to review the teaching practices at the GFEE Centre and orientate these to the context of the learning needs of baTswana children.

Badenhorst (1989) reflected critically on the South African educational system's emphasis on the transfer of knowledge, and suggested that it should have rather been providing a balanced proportion of skills to suit a changing society. Ballantyne (1987:9) also found that due to the intransigence of the South African educational planners and decision-makers in facilitating

pupil-centred teaching approaches, the system "...encourages the teaching of factual information in preference to the development of attitudes and values."

One curriculum development initiative that has great relevance for environmental education in southern Africa, is the Science Curriculum Initiative in South Africa (SCISA), which is attempting to stimulate the development of "more relevant syllabuses" which allow "all pupils to be introduced to science in primary and lower secondary schools in an exciting, environmentally relevant and conceptually sound way" (McNaught *et al.* 1990:1). Three basic principles formulated by SCISA (McNaught *et al.* 1990:4) are:

- Scientific ideas are provisional and relative;
- Pupils construct scientific knowledge themselves; and
- Environmental (as well as technological) concerns are central to curriculum development.

One problem in the South African educational system has been the large number of educational departments involved within different communities. Ballantyne and Oelofse (1989) noted that due to the complex, racially segregated education system in South African schools the nature of educational experiences at classroom level differed markedly from department to department. They quoted the Human Sciences Research Council's (HSRC 1981) and Hartshorne's (1986) findings that these differences arose due to varying pupil/teacher ratios, teacher qualifications, financial provisions and the quality of educational facilities afforded to the different racial groups - "...teachers in 'Black' schools are generally less qualified, have poorer facilities, less access to textbooks and resources and have to contend with higher pupil numbers in the classroom than 'White' teachers." Thirion (1989a) found similar problems through his research on education in black communities.

Discussing influences upon the curriculum in post-colonial Africa, Hawes (1979) examined the implications of the material context of the school, the administration, historical implications, and social issues. It was interesting to note his comment on 'survival teaching' in which teachers passed on to successive teachers faced with "long hours, poor conditions, and low recognition", the survival tactics of maintaining authority, reducing work pressure, saving time, and achieving passable examination results. These influences were also found to hold true within the South African context (Thirion 1989a).

The essentially teacher-centred approach to teaching which exists in southern Africa was commented upon by Holderness (1987) in his review of the Primary Education Upgrading Programme (PEUP) in Bophuthatswana. Twelve of the PEUP coordinators revealed that it was their experience that most of the schools were dominated by male figure-heads or power structures who relied on authority, rigidity and a 'rule by fear' style of teaching where modern teaching practices were rejected. The challenge for environmental educators in in Bophuthatswana who attempted to employ enquiry-based, pupil-centred approaches in order to develop environmental attitudes and values (Ballantyne & Oelofse 1989) was therefore considered by the researcher, to be a formidable task.

Although the syllabus offered at the Gold Fields Centre was structured in a way that it provided a degree of support to teachers who utilised it as an extension of their school syllabus, the GFEE Centre programme was also designed to *supplement* the National Education Curriculum with learning experiences for children according to the principles of environmental education (UNESCO-UNEP 1978). These supplementary learning experiences were usually related to processes which were encompassed within the IUCN's definition of environmental education.

Macdonald (1990a) in her study of BaTswana children in Bophuthatswana Primary Schools, investigated cross-cultural education and identified a possible conflict between indigenous educational approaches and westernised ones. The researcher noted the issue as an element to investigate in this research process because it was seen to have possible implications for syllabus development in the Gold Fields Centre programme.

2.5 IDEOLOGIES AND SCHOOLING IN SOUTH AFRICA

"All education systems are shaped by certain worldviews and values. Education is not neutral. ... People have different worldviews, and these worldviews influence the sort of education that they want."(Christie 1985:158). National education policies have determined the structure, curriculum and approach of education in South Africa and the foundation of these policies and their implementation have been moulded by a number of predominant ideologies (Ashley 1989). Of particular concern to this study are those ideologies that have

played a major role in determining the educational situation that exists in South Africa in 1993. Ashley (1989:5) broadly places these ideologies into three categories:

- Christian Nationalism;
- Liberalism; and
- Liberation Socialism.

These three categories are briefly covered in the following sections.

2.5.1 Christian Nationalism

Prior to 1839 education in South Africa was almost exclusively conducted through missionary processes. Christian National Education (C.N.E.) was first applied to South African education in the early 1800's as part of an attempt to introduce Calvinist teachings to the society of the sub-continent (Christie 1985). C.N.E. is heavily influenced by Biblical authority and its proponents therefore feel that it is necessary to ensure that the proper development of a young child takes place from the perspective of intrinsic human weakness and temptation to sin (Ashley 1989). Gluckman (1981 cited in Ashley 1989:9) points out that in her study of C.N.E. (and its subsequent body of educational theory namely Fundamental Pedagogics) and its theorists, that "they all looked at childhood in a negative way, as deficient. This deficiency is remedied by an education orientated to adulthood. Thus the belief that adulthood is the aim of education is a theme constantly emphasised."

Ashley (1989) also points out that the other fundamental aspect of C.N.E. is the importance of community and nation. The qualities that characterise a nation are given by him as: a common language, religion, history, culture, philosophy of life, customs, political traditions and a legal system. This definition was used to create the legally segregated approach to education in South Africa through legislation such as the 1953 Bantu Education Act, the 1965 Indian Education Act and the 1967 National Education Act.

Other aspects that are seen to characterise the C.N.E. approach to education are the need for education to be in the mother tongue for as long as possible as language is considered to be the carrier of culture, and the "inculcation of a genuine appreciation of values, norms, authority and cultural inheritance" (Landman and Gous 1969 cited in Ashley 1989:10). The

need for children to accept the authority of norms and to be obedient to authority is inherent in the C.N.E. ideology (Ashley 1989).

2.5.2 Liberalism

The liberal perspective of schooling is based on the philosophy of humanism that developed in the Renaissance and subsequent thinking which stressed the "importance of the individual as the centre of social life" (Ashley 1989:29). Modern liberalism, which views mankind as being born with the potential for good, stands educationally for the "development of the individual to his full potential, with due regard for his obligations to society." (Ashley 1989:30). Enslin (1986 cited in Ashley 1989:30) asserts that "the promotion of individual autonomy is the central aim of liberal education" based upon personal autonomy, moral autonomy and democratic participation.

The Transvaal Teachers' Association in 1980 published a document (cited in Ashley 1989:32) based upon the liberal tradition which stated that: "The aim (of education) is to encourage the growth of the whole child, primarily for his own sake but also for the sake of his fellow man (for society's sake)." In educational terms one of the effects of the liberal approach to education is that local communities and parents should be involved in important decisions regarding their children's schooling, in particular the curriculum.

2.5.3 Liberation Socialism

This perspective on education is essentially centred around Marxist thinking which relates to man's fundamental activity of work (labour), his consequent relationship with his fellow man, production of goods and the creation of wealth in society (Ashley 1989). In a capitalistic society the worker is denied the opportunity to participate in the determination of conditions under which they labour, and are therefore alienated and powerless. An important view here is Marx's contention that contrary to the doctrine that people are the product of their circumstances and education, it is in fact people who change circumstances. "Thus the changing of both circumstances and education can be understood rationally only from the standpoint of purposeful human activity, or *praxis*" (Ozmon & Craver 1986:272).

In the socialistic analysis the human being may have great potential, but is shackled by oppressive social arrangements. Under socialist conditions the alienation and ignorance of the people would be overcome and the people would rise to their full potential and be happy, productive, in true union with their fellow men (Ashley 1989). Education's task in this case would be to make people aware of the conditions of their oppression and to ensure that schools and other educational institutions do not reinforce the individualistic and inequitable situation of capitalism (Ashley 1989).

2.6 CONCLUSION

The review of literature led the researcher to realise that the relationship between values and attitudes was found to be a close one, in which the dynamic role of attitudes was apparent in the processes of judgement and decision-making, whilst values were seen to have a function in choosing between alternatives (Schreuder 1990). These concepts had also been identified as important aspects of environmental education as given in the Tbilisi Principles (UNESCO-UNEP 1978).

Through the review of literature the researcher also focused his use of the term 'perception' to a more *universal* sense which relates to how people make sense and meaning of their world. Linked to this was a refinement of the concept of 'worldview' that the researcher attributed to the BaTswana children that attended the GFEE Centre programme. Here the worldview was seen to relate to attitudes through the fusion of inner feelings and drives, knowledge and beliefs; and to values and perceptions through what views and beliefs people develop on how the world works and what it is and how members of society should interact with it. The researcher feels that a person therefore creates a worldview based on the meaning or understanding that he or she constructs from knowledge, skills, emotions, values, attitudes and perceptions together with the results of these being assimilated with, or modified by new internal and external influences.

Most of the literature reviewed on the topic of perceptions of the environment was found by the researcher to relate to children, with a limited amount relating to adults. Only a small amount of research into these two areas related to the southern African situation. Three of

the researchers who discussed children's perceptions of the environment felt that knowledge and understanding of the environment is gained from very early ages and that attitudes towards the environment are also formed at these early stages.

The limited literature available to the researcher on adults perceptions of the environment indicated that it could be expected that perceptions would vary widely depending on the influence of social factors. A number of misconceptions about environmental issues were felt to exist in adults and that these were being passed on to younger generations.

Through a review of literature the researcher was able to compare the behaviourist and process approaches to developing curriculums. The 'process approach' to curriculum development was noted for consideration of research into, and modifications to the syllabus of the GFEE Centre. Ballantyne and Oelofse (1989) recommended this approach with regard to the training of teachers in environmental education approaches, and commented that:

...it is vital to include practising teachers, teacher training personnel, departmental representatives and environmental education specialists in the research process. Participatory research, where individuals from interested groups are actively engaged in developing training models (curricula - researcher's inclusion) in workshop sessions is essential if environmental education is to be successfully introduced into schools.

The principle was seen by the researcher to apply equally to the development of curriculums for children.

Acknowledgement of the ideological foundation of educational approaches and systems is important to the study of existing education problems, and for the modification of environmental education programmes that link in with national education authorities.

CHAPTER THREE

METHODOLOGY

Critical social scientific research requires the development of self-reflective communities of practitioner-theorists committed to critically examining their own practices and improving them in the interests of rationality and social justice.

Kemmis 1988:48

3.0 INTRODUCTION

This chapter outlines the research methods chosen by the researcher to investigate in more depth some of the environmental education issues identified by Mahape (1988) at the Gold Fields Environmental Education Centre (GFEE Centre). It also describes some of the attempts to improve the programme.

3.1 GENERAL RESEARCH APPROACH

The approach chosen for this research was a case study method (Stenhouse 1988), based on ethnographic principles (Taft 1988). An action research approach (Kemmis 1988) was also used as a strategy to ground the process of modifying the curriculum in the reality of the social processes within which it exists and not in an "idealized or objectified world" (Grundy 1987:135). The action research approach has been reported in chronological order to allow the reader to see how the process unfolded.

3.1.1 The Case Study approach

A case study approach was seen to be most appropriate so that more defined research hypotheses could be developed which could be used in further research (Dane 1990). Mc Neill (1990) explains that a case-study involves the in-depth study of a single example of a particular issue, which may "prompt further, more wide-ranging research, providing ideas to be followed up later". An important aspect that he points out is that it has no claim to representativeness, and that "the essence of the technique is that each subject studied,

whether it is an individual, a group, an event or an institution, is treated as a unit on its own.

A case study, though does allow limited generalisation about the wider population to which the unit belongs (Cohen & Manion 1989). Although the primary purpose of the research was to improve the curriculum at the GFEE Centre, the information gathered in the case study could be of value to environmental education programme practitioners and developers who have similar problems to the GFEE Centre, or to provide information for similar research.

Advantages of the case study approach are considered by Cohen & Manion (1989:150) to be:

- the data is 'strong in reality', and thus provides a natural basis for generalisation either about an instance or from an instance to a class;
- the approach recognises the complexity and embeddedness of social truths;
- it may form an archive of descriptive material sufficiently rich to admit subsequent reinterpretation for research with purposes other than the existing case study;
- case studies are a 'step to action', beginning in a world of action and contributing to further action. Their insights may be directly interpreted and put to use or used for formative evaluation;
- the approach presents research data in a more publicly accessible form - possibly contributing to the democratisation of decision-making and knowledge.

The particular type of case study used in this research conformed to the principles of 'ethnographic' research, in which the researcher engaged in the data generating process as a part of various sample groups (Taft 1988). Such participation in the group "provides investigators with an understanding of the culture and interactions between the members" that may not be possible to obtain through other research techniques (Taft 1988:59). Such ethnographic research methods are sometimes equated to participant observation.

Participant-observation attempts to generate the data from the perspective of the individuals or groups being interacted with (Wiersma 1986). An additional classification of the type of case study approach used was described by Dane (1990:158) as that of being a 'participant-as-observer', where the researcher took part in the activities, with the observer's status as researcher being known to the group. The researcher felt that this view of the process accurately described the intended approach that was considered for the casestudy on the GFEE Centre programme.

Cohen & Manion (1989:125) provided a further perspective to the technique, as that of '*unstructured artificial*' *participant observation*. The situation was considered to be artificial from the point of view that it was not the 'normal everyday' teaching activities that were being observed, and that the data gathering process was not a structured one in the form of questionnaires, but rather took the form of collaborative discussion on various issues relating to learning processes and educational issues.

The advantages of the participant observation method have been recognised by many social researchers (Sanders & Pinhey 1983: 49; Cohen & Manion 1989:128; Horton & Hunt 1980:26; Moser & Kalton 1971:254). Some of these advantages are given by Cohen & Manion (1989:128):

- observation studies are superior to experiments and surveys when data are being collected on non-verbal behaviour;
- the investigator is able to discern ongoing behaviour as it occurs and is able to make appropriate notes about its salient features;
- because the observations take place over an extended period of time the researcher can develop a more informal relationship with those he/she is observing, generally in more relaxed surroundings than those of experiments.

A further factor in favour of the use of a participant-observer approach is that it relates to the idea of contextualisation, where in order to "understand behaviour, the observer must understand the context in which individuals are thinking and reacting" (Wiersma 1986:235). It is through this process that the observer can move beyond purely objective recording of what happens in the research process, and interpret events and peoples reactions, as with participants in workshops. This approach, therefore has direct relevance for this study, where the researcher is attempting to understand the context in which BaTswana children view their environment.

Criticisms of the case study approach are that it is subjective, biased, impressionistic, idiosyncratic and lacking in the precise quantifiable measures of the natural sciences experimentation methods (Sanders & Pinhey 1983:49; Cohen & Manion 1989:129; Horton & Hunt 1980:26; Moser & Kalton 1971:252). These 'weaknesses' generally relate to the

external validity of the approach, whilst the internal validity may be controlled through the use of various verification techniques (Cohen & Manion 1989:129). Although participant-observation is seen to be subjective, Walker (1985:84) argues that "there is no reason for not using subjective impressions as starting points for trying to get more conventionally objective data." Such a view characterises the approach used in the conceptualisation of this study.

The concept of a case-study "contributing to further action" (Cohen and Manion 1989:150) and the possibility of using participant-observation within action research (Walker 1985), supported the researcher's choice to adopt action research as a strategy within the case study, to formalise and precipitate the process of action.

3.1.2 Action research as a research strategy

A study of the curriculum development theory propounded by Stenhouse (1975) and Grundy (1987) guided the researcher to accept the concept of 'praxis'- practical action (Grundy 1987:65) or informed, committed action (Kemmis 1988:45) as a meaningful method of approaching educational innovation at the GFEE Centre. Stenhouse (1975:143) concluded that all well-founded curriculum research and development is based in the study of the classroom situation, and therefore on the work of the teachers themselves. Both Stenhouse (1975) and Grundy (1987) saw that action research could be the process by which teachers could develop curriculums with the greatest validity through their own actions and reflections.

Action research as it is used in education, originated in John Dewey's philosophy of reflective thinking (Dewey 1933 and 1965) which argued that thought cannot be divorced from action. In the early 1940s Kurt Lewin provided a method by which to apply Dewey's philosophy in developing the methodology of action research. Lewin saw that action research contained three important characteristics: a participatory nature, a democratic impulse and a simultaneous contribution to both social science and social change (Kemmis 1988:42). The reciprocal relationship between theory and practice was also seen to be embodied in the process of action research which in its fullest sense produces liberating changes in practice that are often emancipatory in nature (Grundy 1987:154). Grundy (1987:146) however

recognises three modes of action research which relate to the activities that are encompassed in the process: technical, prudent action and emancipatory. The technical approach is considered to only produce superficial improvements in a social situation, whilst the emancipatory mode results in fundamental changes to the power relationships implicit in a social practice.

Lewin's perspective of action research has however been criticised by Kemmis (1988) as being transitory and without long term commitment; as being a deterministic or patronising 'technique' rather than an embodiment of true democracy in the research process; and of using positivistic language which is incompatible with non-positivist social science philosophies. The practice of current action research is considered by Kemmis (1988:42) to conform more closely to Carr and Kemmis' (1983:158) outline of the requirements for any adequate and coherent educational science, which:

- a) rejects positivist notions of rationality;
- b) employs the interpretive categories of teachers (or the other participants directly concerned with the practices under enquiry);
- c) provides ways of distinguishing ideas and interpretations which are systematically distorted by ideology from those which are not, and provides a view of how distorted self-understandings can be overcome;
- d) is concerned with identifying and exposing those aspects of the existing social order which frustrate rational change, and are able to offer theoretical accounts which enable teachers (and other participants) to become aware of how they may be overcome; and
- e) are based on an explicit recognition that it is practical, in the sense that the question of its truth will be determined by the way it relates to practice.

The process of action research is seen by Kemmis (1988:42) to consist of self-reflective cycles of planning, acting, observing and reflecting. This process was seen by Kemmis to allow teachers to engage in a self-reflective process of enquiry to improve the rationality and justice of a) their own social and educational practices; b) their understanding of these practices; and c) the situations in which the practices are carried out. O'Donoghue & McNaught's (1991:396) model of the action research process emphasised the role of dialogue and critical comment in the planning stage, and appeared to minimise the importance of

observation as a stage in the cycle, although the researcher believes that this stage is an important one as it is grounded in the practical elements of research (Grundy 1987:145).

A possibly less theoretical approach to action research which is not grounded in critical theory is that described by Cohen & Manion (1989:223-4) as a small-scale intervention in the functioning of the real world, with a close examination of the effects of the intervention. The two key elements of the process identified by them relate to it being *situational* in that it was concerned with the diagnosing of a problem in a specific context and solving it in that context, and that it should result in the *improvement of practice*. Practice, as it was understood by action researchers (Kemmis 1988:45), is "informed, committed action" or *praxis*, which relates more closely to a critical approach. Some characteristics of action research identified by Cohen and Manion were:

- it should be *collaborative*, by involving researchers as well as practitioners as a team;
- it should be *participatory*, with all team members implementing the research; and
- it should be *self-evaluative*, where modifications are made on an on-going basis, adding to the functional knowledge of the practitioners.

This form of research was found to be increasingly chosen by curriculum developers (Kemmis 1988:42) as a means of obtaining meaningful information about educational needs and facilitating change in educational processes. Therefore, the action research process was seen by the researcher to be highly relevant to the development of the environmental education programme at the GFEE Centre in that it: allowed the participation of stakeholders; encouraged teachers to become researchers; attempted to resolve a problem within its own context; and it was likely to stimulate action.

3.1.3 Developing the action research strategy

The evaluation and development workshops held in July of 1988 and 1989 (Refer Section 4.3.2), provided valuable information about the pedagogical problems that existed at the GFEE Centre. The participants in the workshops were inexperienced student teachers with urban backgrounds, and the researcher felt that they did not have the relevant background to comment on the true learning needs of BaTswana children. The validity of their

reflection, dialogue and practice (O'Donoghue & McNaught 1989:19) was thus felt to be questionable by the researcher.

A direct investigation of a sample of BaTswana children to obtain a first hand perspective of their worldviews was considered, but it was felt that this would necessitate a level of inquiry beyond the limited scope of this thesis. The most effective alternative was therefore to gain a perspective from practising BaTswana teachers who were considered by the researcher to be the best placed people to have possible insights into the thinking and learning processes of children in Bophuthatswana. A number of school teachers were therefore requested to participate in a series of workshops to discuss issues related to BaTswana children's worldviews. The profile of this sample of teachers is discussed in Section 3.2.

O'Donoghue & McNaught (1989) influenced the researcher to adopt an action research approach in this study as a *strategy* to ground changes to the GFEE Centre programme in the reality of the social processes in Bophuthatswana. It was also intended to be used as a method of allowing participant teachers to assess and hone their teaching skills (Grundy 1987:191). The research was initially designed to consist of two workshops, attended by practising school teachers and teachers from the GFEE Centre.

Each workshop was designed to encourage teachers to reflect on the learning experiences of their pupils, with special regard to the environmental issues. The debate was also expected to provide the researcher with some insight into the worldviews of BaTswana children, and through this assist in improving the curriculum at the GFEE Centre.

The descriptive method of reporting action research may at times result in reports which are lengthy and too extensive for this level of thesis. Chapter 5 contains the researcher's synthesis of the various workshops carried out during the research, and this may be seen to introduce elements of bias from the researcher's personal interpretation of the data obtained. It is however recognised by the researcher that it is impossible to prevent elements of one's own value judgements sub-consciously influencing the interpretation of the proceedings to some small extent. *The researcher has at all times attempted to remain critically aware of this possibility and to provide a fair reflection of the intent portrayed by the participants.*

3.2 PARTICIPATING TEACHERS AS SAMPLE GROUPS

The study was originally designed to have two groups of ten practising teachers, drawn as a purposive sample (Sanders and Pinhey 1983) from a cross-section of urban and rural primary schools in the Mankwe Region of Bophuthatswana adjacent to the Pilanesberg National Park. This sample was considered to be a close representation of the general primary school teachers from Bophuthatswana, based on the qualifications of all primary teachers from the seventeen circuits or districts (Bophuthatswana Department of Education 1990:74-75)(Refer Table 3.1).

It was noted by the researcher from the data in Table 3.1 that the majority of primary teachers in Bophuthatswana (87%+) only hold a standard 8 or 10 qualification. 93% of the teachers in the Mankwe Circuit were noted to have a standard ten or lower qualification.

It was also considered very probable that the majority of the teachers in Bophuthatswana had been influenced by the social (Nasson & Samuel 1991) and educational (Christie 1985) influences of Bantu Education prior to Bophuthatswana's nominal independence in 1977, and conform to the 'model teacher' produced during this era. It may therefore be assumed that a sample drawn from this circuit would be broadly representative of other primary teachers in the country, when viewed from a teaching experience and ability background.

The researcher initially obtained permission to invite the participants to the research workshops by approaching the Department of Education's local Circuit Office. A letter was then sent to each of the teachers designated by the headmaster of selected primary schools. The researcher initially had no influence in the selection of individual teachers except that of requesting teachers who were involved in teaching environmentally related subjects. This process encouraged the selection of a wide range of teachers with differing attributes and characteristics.

Table 3.1 Comparison of primary teachers' qualifications (1990)

Circuit	Teacher qualifications					With Std 8+ % of Total
	W/Out Std 8	Std 8	Std 10	B.Deg/ Other	TOTAL	
Ditsobotla	16	203	165	1	385	96
Ganyesa	16	146	52	0	214	93
Ga-rankuwa	26	255	443	13	737	95
Jericho	3	146	246	6	401	98
Kudumane	51	337	114	1	503	90
Lehurutshe	13	210	197	4	424	96
Mabopane	15	198	387	27	627	93
Madikwe	13	187	145	0	345	96
Makapanstad	16	212	322	1	551	97
Mankwe	42	301	279	3	625	93
Marapyane	3	126	230	1	360	99
Molopo	69	415	320	37	841	87
Moretele	13	229	352	10	604	96
Setlagole	24	166	102	0	292	92
Taung	80	463	150	0	693	88
Thaba 'Nchu	44	292	86	4	426	89
Thlabane	<u>23</u>	<u>238</u>	<u>200</u>	<u>0</u>	<u>461</u>	95
Totals	<u>467</u>	<u>4 124</u>	<u>3 790</u>	<u>108</u>	<u>8 489</u>	

(Source: Bophuthatswana Department of Education 1990:74-75)

3.3 METHODS OF DATA RECORDING AND COLLECTION

The basis of data collection in ethnographic and interpretive research are audio and visual field recordings of actual events, which also involves an element of interpretation of these during analysis (Goetz & LeCompte 1984). A wide variety of recording methods and mechanisms such as field-notes, tape-recordings, video-recordings, interviews and diaries may be used with these methods (McNiff 1988).

The type of data collected during this research conformed to categories outlined by Bassey (cited in Hustler *et al.* 1986:19) such as "Reports of experience" and "Expressions of opinion", and those given by McNiff (1988:77) which are "Interviews and discussions."

In this study the participants in each group were consulted on the method of data collection, and their consent was obtained to tape-record the proceedings for future reference by the researcher. The researcher's preferred method of recording though, was a flipchart. This allowed the participants to see what had been recorded, and to disagree with an incorrect interpretation by the researcher. The flipchart also provided a means of allowing the group process to flow, with the researcher still being part of the discussion. It also proved to be the easiest means of recording data for later reference and interpretation. The use of a 'whiteboard' was rejected due to the constant need to transcribe information onto another format before proceeding with the discussions, thus creating delays and duplication. Video recording was considered but not used due to technical complications involving lighting and camera operation.

The original flip chart sheets with the raw data have been retained and are lodged with the researcher should they be required for scrutiny.

3.4 DATA ANALYSIS AND SYNTHESIS

The basic form of data analysis used in this study was through discussion, where the participants came to consensus on issues identified. McNiff (1988:85) explains that,

The philosophy of action research suggests that an appropriate form of analysis would be through discussion of criteria and area of concern as well as isolated instances of behaviour. Analysis is to do with making sense of what is going on in real life.

Where participants were requested to comment on environmental issues, content analysis was used on the data collected to systematically quantify the written data for statistical examination (Sanders & Pinhey 1983). In all cases 'concepts' were taken to be a unit, with words or groups of words being associated to "conceptual clusters" such as 'man-made elements' or 'natural elements' of the environment (Sanders & Pinhey 1983:191).

The synthesis of the action research process is provided here as the main body of this thesis, in a "form that is easily communicated to, and comprehended by other people" (McNiff 1988:85).

3.5 CONSTRAINTS OF THE RESEARCH APPROACH

The action research strategy within a case study was established by the researcher to be a protracted approach, which required unrestrained time to carry it out. The reason for this was that the process is based on allowing the participants in the research a degree of latitude in structuring the procedure. Further constraints are discussed in Section 6.1 within the context of the discussion on the study.

3.6 RELIABILITY AND VALIDITY OF THE RESEARCH METHOD

The validity of the research method used in this study was based on the three generally accepted categories of validity: face, internal and external validity (Sanders & Pinhey 1983; Wiersma 1986).

Face validity, which Sanders and Pinhey (1983:88) describe as a process that "logically appears to be measuring what it tries to measure", was introduced by designing the sample population of participants to be teachers of primary school children. The workshops also

encouraged the participants to discuss specific pedagogical topics in an attempt to expand their own and the researcher's knowledge of issues identified in the aims of the research (Refer Section 5.1.5; 5.2.6; 5.3.6).

Wiersma (1986:4) defines internal validity as "the extent to which the results can be accurately interpreted". This aspect is considered by some researchers to be a problem within action research, due to its interpretive and qualitative nature. The researcher attempted to achieve internal validity by only using a view or perception that a great deal of acceptability to the majority of the participants in the workshops, and if possible was a consensus opinion. An important process in the quest for internal validity is seen by McNiff (1988:132) to be *self validation* through 'intentional critical reflection', "in which a naive understanding of practice is transformed." Such critical reflection was carried out at the end of each workshop.

The main element of external validity is seen to be the possible generalisability of results obtained (Sanders & Pinhey 1983). Although this is a case study, any factors that allow a greater and more flexible use of the results by others enhances the worth of the research. To achieve this the study attempted to involve groups of participants that adequately represent the characteristics, for example age profiles, views, capabilities and experiences, of the wider population to which it belongs within Bophuthatswana. An important comment on this issue is made by Lomax (Cited in Mc Niff 1988:131):

as action researchers we do not claim to find the final answer to a question, but we do claim to improve (and change) educational practice through the educational development of practitioners. ...The validity of what we claim would seem to be the degree to which it was useful (relevant) in guiding practice for particular teachers and its power to inform and precipitate debate about improving practice in the wider professional community.

A "common challenge to action research is that it is subjective and therefore unreliable" (McNiff 1988:131). The problem of accurate replication in reliability may be achieved to a degree through increasing the number of study units (workshops in this case). The nature of action research which promotes personal growth and reflection, however, does not preclude that differing results may be obtained from each study.

CHAPTER FOUR

PRELIMINARY WORK ON PROGRAMME

Environmental education must ensure that it does not repeat the mistakes of other well-intentioned syllabus revisions which, although designed to develop concepts, attitudes and values, have resulted essentially in the upgrading of teacher content knowledge without altering teacher classroom practices.

Ballantyne & Oelofse 1989:10

4.0 INTRODUCTION

Problems identified with the environmental education programme at the Gold Fields Environmental Education Centre (GFEE Centre) (Mahape 1988) stimulated the researcher to examine the programme with special reference to the institutional and pedagogical problems indicated in Section 1.4.1 and 1.4.2 of this study.

Figure 4.1 summarises the steps taken in the process which took place between 1988 and 1990, prior to the main portion of this research being conducted.

4.1 HISTORICAL ANALYSIS OF THE GFEE CENTRE PROGRAMME

An Historical Research approach was used to explore the background of the environmental education programme used at the GFEE Centre prior to the start of the study. Charles (1988:7) describes such an Historical Research approach as one which "describes, and often attempts to explain, conditions and situations, and events in the past." Primary sources of data (Eichelberger 1989) such as original documents were examined wherever possible. Due to the researcher's close relationship to the environmental education function within the Bophuthatswana National Parks Board, many of these documents were still accessible for scrutiny.

INSTITUTIONAL	YEAR	EDUCATIONAL
<p>Increased demand from schools to visit GFEE Centre identified by BNPB staff.</p> <p>Monitoring of bookings by schools for visits to GFEE Centre through reservations system.</p>	1988	<p>Mahape Research report made available.</p> <p>First workshop held with trainee teachers to evaluate GFEE Centre programme & developed resource kit.</p>
<p>Management continued to monitor bookings.</p>	1989	<p>Second workshop held with trainee teachers to evaluate GFEE Centre programme</p>
<p>Analysis of GFEE Centre attendance statistics.</p> <p>Motivation to Department of Education for additional teachers at GFEE Centre.</p> <p>Recruitment of additional teachers.</p>	1990	<p>Conceptualisation of Main Research proposal on GFEE Centre programme by researcher.</p>

Figure 4.1 Processes relating to institutional and pedagogical issues at the GFEE Centre : 1988 - 1990.

4.2 INSTITUTIONAL CONSTRAINTS ON THE PROGRAMME

4.2.1 Identifying problem areas

The B.N.P.B.'s Formal Education Strategy (B.N.P.B. 1987) stated that visits by Standard 3 and 4 classes would cover a minimum of two days, but in reality the programme was limited to twenty-four hours, in an attempt to allow as many school groups as possible to attend the GFEE Centre programme. Other factors such as higher transport costs, extended time away from school and accommodation tariffs also influenced the decision to make the programme span 24 hours, with an overnight stay. The original programme developed in 1982 allowed for one school visit of ninety children per day, handled by two teachers seconded from the Bophuthatswana Department of Education.

During 1988 the staff at the GFEE Centre reported to the researcher that there was an increased demand from schools to attend the environmental education programme provided at the GFEE Centre (Morei 1988 pers.comm.). Feedback from teachers who had attempted to book a visit for their school, comments from teachers who had managed to secure a booking with difficulty and checking with reservation's staff of the B.N.P.B. indicated that a bigger than anticipated demand existed. This trend was verified by reports from Education Extension staff who visited schools with Film Vans. They also reported that teachers at schools complained to them that it was difficult to book a visit to the GFEE Centre with their school groups. The researcher analysed the average quarterly attendance statistics of the GFEE Centre between 1982 and 1987 which showed that most schools preferred to visit the GFEE Centre between May and September each year (See Figure 4.2).

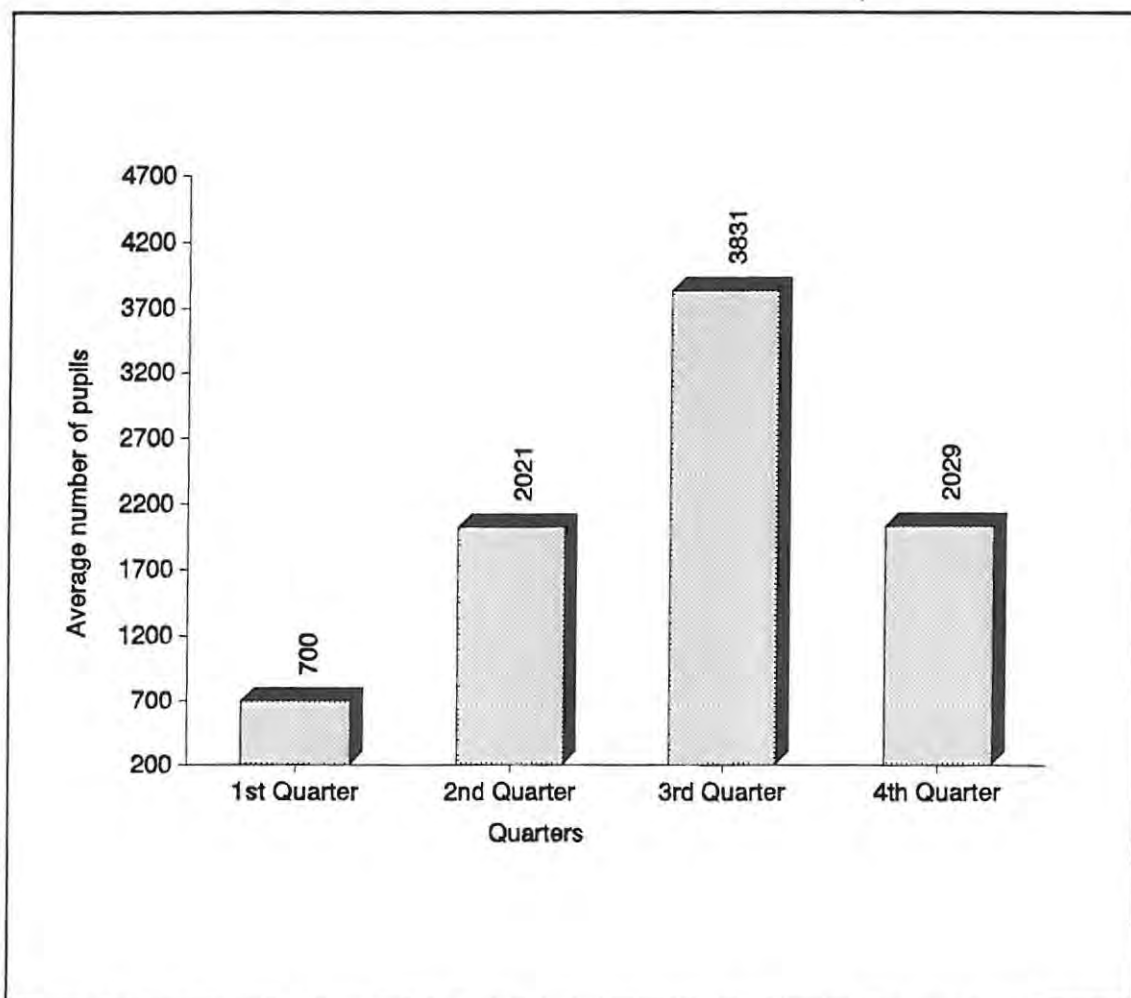


Figure 4.2 Pupils visiting the GFEE Centre: Average of quarterly totals 1982-1990.

Although the statistics generated from actual figures of attendance at the GFEE Centre did not indicate any large increase in annual attendance between 1982 and 1987 (Refer Figure 4.3), it was realised by the staff at the GFEE Centre that they did not portray the total demand for schools wishing to visit the Centre. Requests from schools monitored through the B.N.P.B.'s reservation system during 1988 and 1989 (Morei 1989 pers. comm.) showed that many schools were being turned away due to a lack of space at the GFEE Centre itself, additional overnight accommodation was available for other school groups should additional capacity at the GFEE Centre be arranged.

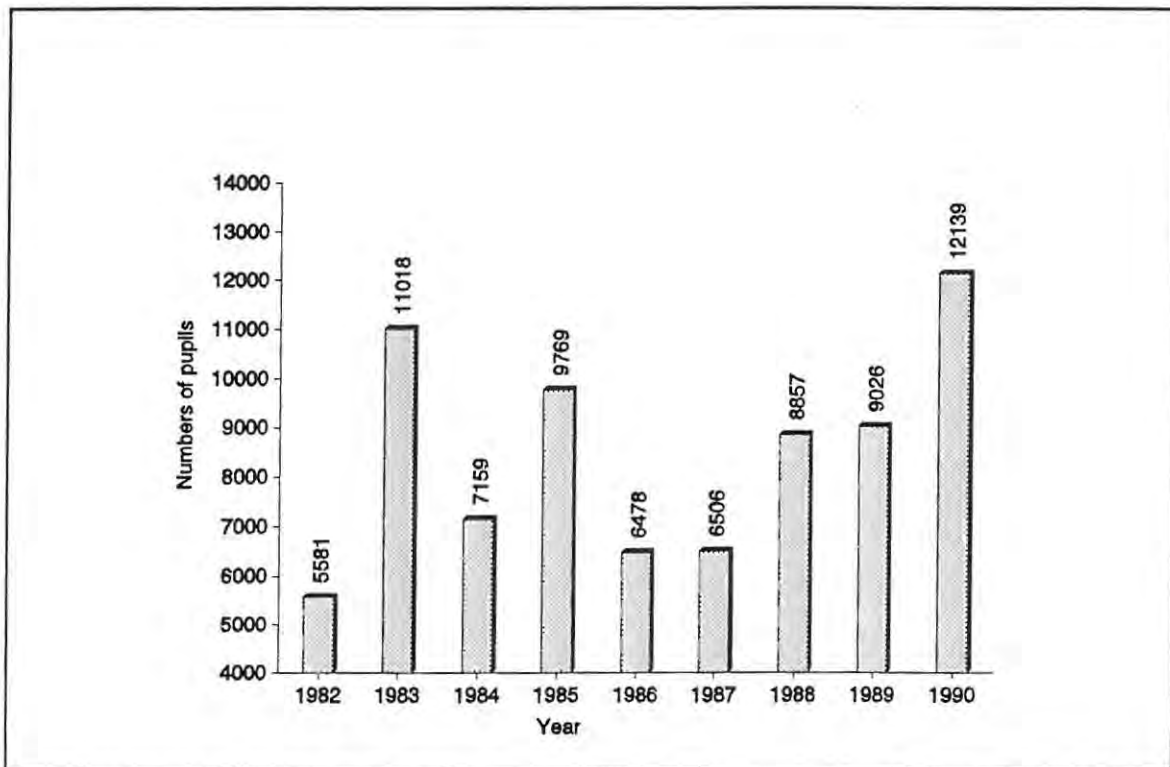


Figure 4.3: Total number of pupils visiting GFEE Centre annually: 1982-1990

The researcher used national demographic data to orientate the capacity of the GFEE Centre to the potential demand from schools throughout the country. The researcher felt that this was necessary if the Bophuthatswana National Parks Board was to achieve its objectives relating to environmental education within the country (Refer Appendix B).

The following is an example of the calculations carried out to examine the situation from a macro level:

A statistical breakdown of pupils in Bophuthatswana schools (See Table 4.1) added perspective to the situation regarding the number of primary school pupils in Bophuthatswana who were potential visitors to the GFEE Centre. In 1987 only 6 506 children were accommodated on the GFEE Centre programme, whilst a total of over 350 181 primary school children were enrolled in Bophuthatswana schools (Refer Table 4.1). Of the primary school children, 109 546 pupils were in standards 3 and 4, and therefore targeted standards. The 120 839 Middle School pupils were also potential visitors to the GFEE Centre.

Table 4.1 Total pupil and school numbers: Bophuthatswana

School Type	Pupil Numbers (1987)	Pupil Numbers (1990)	Teacher Numbers (1990)
Primary School pupils	350 181	360 866	10 839
Middle School pupils	120 839	134 551	4 372
Secondary School pupils	63 755	83 297	2 873
Total pupils	534 775	578 714	18 084

(Source: Bophuthatswana Department of Education 1990:70-73)

In 1988 the researcher used the following data to indicate the limitations of the GFEE Centre in providing an environmental education service on a national level.

Table 4.2 Annual capacity of GFEE Centre

School days available per year	170	days	[a]
Daily capacity of Centre (2 x schools)	180	pupils	[b]
Annual capacity of Centre ([a]x[b])	30 600	pupils	[c]
Theoretical annual capacity ([c]x80% ¹)	±25 000	pupils	

¹Based on experience at the GFEE Centre it is assumed that 100% capacity is unlikely to be achieved due to communications problems with rural areas, late cancellations and non-arrivals. 80% accommodation is a target generally aimed for in the hotel and hospitality trade.

The researcher concluded that this theoretical capacity of 25 000 school children was limited when compared to the 109 546 standard 3 and 4 children in Bophuthatswana in 1987. In any given year therefore only 23 per cent (25 000/109 546) of the standard 3 and 4 pupils, or only 5 percent of primary and middle school children in the country could have an opportunity of visiting the GFEE Centre. Due to constraints such as volume of work in other standards, it was noted by the researcher that there were few repeat visits by children, effectively meaning that only 23 percent of all school children in Bophuthatswana attend the environmental education programme at the GFEE Centre once during their school career.

A further factor which was considered in the development of appropriate programme content and teaching approaches was the range of ages found in the Standard 3 and 4 classes throughout the country (Bophuthatswana Department of Education 1990:77). Table 4.3 shows that in 1990 over 80 percent of the pupils in standards 3 and 4 were between 10 and 14 years of age.

Table 4.3 Pupils' age ranges: Standard 3 & 4 (1990)

Age	Number of pupils	
	Std 3	Std 4
9	2 419	110
*10	9 902	2 264
*11	13 010	8 200
*12	10 859	10 164
*13	8 834	8 953
*14	5 370	6 795
*15	3 517	4 603
16	1 577	2 495
17	646	1 180
18	<u>267</u>	<u>466</u>
Total	<u>56 401</u>	<u>45 230</u>

(Source: Bophuthatswana Department of Education 1990:70-73)

It was noted from the above that the programme contents and teaching approaches developed for use at the GFEE Centre had to take into account the cognitive capabilities of children

between the ages of 10 and 15 years of age, with the median of this range being children of 12 years of age. This range was seen to correspond loosely to the period of 'organisation' in Rejeski's (1984:33) classification of environmental perceptions, and Piaget's 'concrete operational' and early 'formal operational' stages (Novak 1978).

All the constraints outlined above influenced the development of more effective programmes at the GFEE Centre, by either reducing the time available to conduct an adequate programme, or by placing teachers under pressure with large group sizes which possibly reduced the effectiveness of each pupil's individual learning experiences.

4.2.2 Strategies to alleviate institutional constraints

With the above constraints a number of alternative strategies were considered by the Bophuthatswana National Parks Board in an attempt to alleviate the problems.

The researcher reviewed the identified constraints at the end of 1989, and a number of adjustments were made to the management and administrative systems of the GFEE Centre in an attempt to relieve the problems. Firstly, reservation procedures were corrected and communication with interested school groups was improved. Secondly additional staff for the GFEE Centre were negotiated with the Department of Education, Bophuthatswana. The complement of two seconded teachers was increased to six by 1990, allowing for two school groups per day (180 pupils), to be catered for. These changes are considered to have been the factors that enabled the number of schoolchildren visiting the Centre to increase to 12 139 during 1990 (Refer to Figure 4.3).

A third strategy was to train existing teachers or teachers-in-training to use environmental education as a teaching approach. It was hoped that through this teachers would eventually use the GFEE Centre as a resource where they could conduct the learning experiences themselves. The 'pool' of school teachers in Bophuthatswana, 17 995 in total (Bophuthatswana Department of Education 1990:74-75) was considered to be an effective way in which to create a multiplier effect, and reach more children than was then possible through the GFEE Centre only.

Primary School teachers were the most numerous of all the three school categories (Primary, Middle and High schools), with a teacher to pupil ratio of 1:34. This group could have the biggest potential impact when using environmental education, not only as a creative and empowering approach to better teaching, but in reaching the largest number of pupils within schools.

An evaluation of the situation by the researcher showed that the efforts of the National Parks Board's Environmental Education Division were merely scratching the surface of the true challenge - "to enable the people to develop, through appropriate education, a national sense of environmental awareness, which is behaviorally affective in conservation terms" (B.N.P.B. 1987:2). It was even more challenging to ensure that the environmental education experience was an effective and meaningful one given the time constraints set up by the programme, the range in pupil's ages and the programme to be covered.

4.3 IDENTIFYING PEDAGOGICAL CONSTRAINTS ON THE PROGRAMME

This section describes an evaluation and development process carried out at the GFEE Centre by the GFEE Centre staff and two groups of trainee teachers under the guidance of the researcher. The results of the process of enquiry served as a basis for implementing this present research.

The evaluation carried out by Mahape (1988) on the GFEE Centre programme raised a number of issues which related to the concepts of cognitive and affective aspects of learning processes. It is appropriate to briefly examine these two concepts at this stage, to provide a clear perspective on the issues identified by Mahape and their place in educational processes as perceived by the staff at the GFEE Centre.

4.3.1 Cognitive and affective domains in learning

The concepts of cognitive and affective domains are widely used in discussing learning processes (Bloom 1956; Krathwohl *et al.* 1964; Eisner 1982:27; Brady 1985).

Cognitive processes deal with the recall or recognition of knowledge and the development of intellectual abilities and skills (Piaget 1952, as cited in Wadsworth 1978:43; Bloom 1956). The mental combination and synthesis of material (knowledge) with ideas, methods and procedures previously learned are also considered to be processes within the cognitive domain (Piaget 1977; Bruner 1971; Krathwohl *et al.* 1964:6) leading to "the construction of intellectual structures" (Wadsworth 1978:21).

Affective processes encompass changes in interest, formation of attitudes and values and the development of appreciations (Bloom 1956:7), formation of and changes in emotions, and internally consistent qualities of character and conscience (Krathwohl *et al.* 1964) as well as feelings (Fishbein & Ajzen 1975).

An important clarification made in literature is that although the concepts of cognitive and affective domains may be separated for analytical convenience, the two do not exist in isolation of each other but are linked (Scheerer 1954; Krathwohl *et al.* 1964; Gagne 1977). Within the context of environmental education however, Holtz (Cited in Iozzi 1989:5) reported that the "mere participation in a cognitively based environmental education programme does not have a significant impact on the attitudes of children."

4.3.2 An initial approach to programme evaluation and development

The researcher, as the manager of the B.N.P.B.'s national environmental education programme, personally reflected on the content of the GFEE Centre programme and the teaching approaches used by the environmental education staff during the process of management. Contact and discussion with other environmental education specialists (Taylor 1988 pers. comm.), and reflection on some of their publications (O'Donoghue and Taylor 1988; O'Donoghue 1987; O'Donoghue 1986) however, persuaded the researcher to consider the use of more participatory approaches to programme evaluation and development at the GFEE Centre. Stenhouse (1975) comments that implementing change within an education context "is not something that is done to people or for people but as people working together". It was through this realisation that the researcher convened a number of

evaluative and developmental workshops with staff and student teachers to improve the programme.

The researcher ran two workshops using a participatory approach, at the GFEE Centre during the July school holidays of 1988 and 1989. GFEE Centre staff and student teachers from the Thlabane, Hebron and Johannesburg Colleges of Education were invited to attend. These workshops attempted to establish what perceived deficiencies existed in the programme, based on Mahape and Irwin (1988), and to recommend changes to the environmental education programme. The report and conclusions of these workshops are reported in a combined form for ease of reference.

It was agreed by all the participants that any improvements recommended during the workshops should adhere to the Tbilisi Principles together with the stated policy and strategies of the National Parks Board, and that they should be mindful that:

- the majority of groups attending the programme live in a developing society;
- schools that visit usually have very limited resources;
- a large proportion of primary school teachers have limited qualifications;
- teachers are often suspicious of any innovations which might mean an increase in their work-load;
- teachers feel threatened if required to teach subjects they are unfamiliar with;
- any material developed must be relevant to the child's home and school environment.
- learning experiences should where relevant include problem solving and should encourage the pupil to make decisions regarding his or her own environment.

The results of critical debate in these workshops supported Mahape and Irwin (1988) that the environmental education learning experiences offered at the centre should be modified to optimise the children's visits. They also concluded that:

- the GFEE Centre teacher's emphasis on developing the environmentally related cognitive abilities of the children, little or no emphasis was given to developing affective behaviour in the children that might relate to a modification in attitudes towards the environment.
- the twenty four hour programme was too full and consequently did not allow 'quality' learning experiences to be facilitated. The very high pupil/teacher ratio of 34 children to 1 teacher at the GFEE Centre, was seen to be a problem in certain teaching situations which required more personal guidance and input -

resulting in a 'teacher-centred' teaching approach being adopted by the teachers most of the time.

- the syllabus encouraged 'western' approaches to the teaching of scientific concepts which tended to be contextually divorced from the background and experiences of most of the children.
- the more cognitive elements of the programme should be condensed into a 'teachers resource kit' with lesson plans, which would be completed at schools before they visited the centre. This proposal was in keeping with the Formal Education Strategy which advocated that as a general rule the GFEE Centre should not be teaching anything which can be taught equally effectively in the classroom at school or by the school (B.N.P.B. 1987:3). This would enable the learning experiences provided at Pilanesberg National Park to be structured to cover more affective domain elements, through activities such as role-play, gaming, simulation and encounters with nature. Moral or ethical questions relating to environmental issues would be included using a variety of teaching approaches.

A teacher-resource kit was developed by the workshop participants based on two environmental issues seen by them to be of immediate relevance to the school children in their home situations - water related topics and soil related topics. The acquisition and storage of potable water, and the loss of soil combined with reduced soil-fertility were both considered by the workshop participants to be fundamental environmental issues to most rural and peri-urban communities in a developing society. Lesson plans and practical exercises were drawn up and equipment of an 'appropriate technology' nature was included in the kit. Prototypes of the kit were tested by the researcher in some schools in the immediate vicinity of Pilanesberg National Park and exposed to peer review by environmental education colleagues at a Resource Workshop held at Umgeni Valley (Johnson & Morei 1988). Criticism was levelled at the kit by a number of environmental educators, based on the deterministic nature of the lesson plans and activities, and a 'centre-to-periphery' approach of the "research, develop and diffusion (R.D.D.) model" (Stenhouse 1975:219) used in developing the kit.

The problems inherent in developing the kit prompted the researcher to submit it to scrutiny by the Board's environmental education consultants. An evaluation workshop was held early in 1989 with the group at the Pilanesberg National Park, where it was considered by the group to be inappropriate for the purpose intended. The Advisory Group cautioned that the

R.D.D. model used in developing the kit, which was to be imposed on schools, was considered to be a weakness in that it would in all probability not be used by the teachers it was intended to assist. O'Donoghue and Taylor commented that this weakness had been found to be common in many such R.D.D. based projects (O'Donoghue & Taylor 1988). The R.D.D. model for resource or programme development has been criticised by social and educational researchers (Stenhouse 1975:220; Popkewitz 1984) for being a 'centre-to-periphery' approach in which there is a "centralisation of ideas which is not acceptable and that they fail to take account of local variations and local needs." The Advisory Group advised that since no practising school teachers had participated in developing the resource, it was felt that the kit as an 'innovation' in schools would therefore not be widely used because a number of factors had been overlooked in its development. The researcher subsequently found that this view was supported by work done by Moodie (1987:4) who outlined some factors identified in similar innovations at schools:

- a teacher's lack of knowledge about an innovation may create stress within the teacher;
- a change of teaching practice may be taken to mean extra work for the teacher;
- a feeling of loss of control over the learning situation.

In retrospect, the involvement of trainee teachers during the July 1988 and 1989 workshops, in place of practising teachers, is seen by the researcher to have been a contrived attempt at participation and was not therefore a "departure from a centre-to-periphery ideology" (O'Donoghue & Mc Naught 1989:20).

The participation of the GFEE Centre teachers in improving their own programme cannot however be seen in the same light. Their later attempts to modify the programme and remove the problems showed in the view of the researcher a great element of what Grundy (1987:19) refers to as "reflection, participation and emancipation." Progress was made on the question of creating relevance in the programme, when various teaching and learning approaches (Brady 1985) were reviewed within the context of the GFEE Centre's environmental education programme. Analysis of the 'constructivist' approach to learning as outlined by O'Donoghue (1990 pers.comm) and McNaught (1990), gave the researcher greater insight into the complexity of the issues that related to programme change at the GFEE Centre. It became evident to him that the staff at the centre had a limited

understanding of learning theories, especially with regard to children's developmental processes, and how these affected children's 'worldviews' (Sterling 1985). A clearer perspective of developmental psychology was therefore needed before meaningful programme change could be initiated.

4.4 CLARIFYING CONCEPTS IN ENVIRONMENTAL EDUCATION

4.4.1 Educational psychology, environmental education and learning

Research into the theoretical aspects of educational psychology was essential to the understanding of the perceived causes of problems at the Gold Fields Centre. The researcher's review of literature on educational psychology was centred on areas which related to environmental education and to a lesser degree on social aspects which influence the educational process.

Gage and Berliner (1988:3) refer simply to educational psychology as "the study of those thoughts and actions that are related to how we teach and learn", whilst Mwamwenda (1989) describes educational psychology as being the process which identifies the conditions conducive to learning, and how teaching can bring about effective learning. Mwamwenda's description also explains that educational psychology aims to provide the teacher with information pertaining to children's learning behaviour in a variety of contexts such as the home, the school, the social milieu and the classroom, as well as to modes of thinking, the growth of social relationships and attitudes in the course of a person's life. This field of study therefore has a direct bearing on the environmental education programme at the GFEE Centre.

The use of learning theories such as the hierarchy of intellectual skills developed by Gagne (Brady 1985) and Bloom's Taxonomy of Educational Objectives (Bloom 1956) in general educational situations is widely acknowledged (Cronbach 1977; Miller *et al.* 1982; Gage & Berliner 1988). Rejeski (1984) sees a role for these 'additive' processes of learning. in environmental education. He argues that the organisation and structuring of information or

experiences underlie the invariant sequencing of cognitive development. It is however important to realise that specific learning theories and teaching approaches may be applicable in given situations (Dewey 1956), or in the words of Brady (1985:11) - "A thorough knowledge of all the models leads to greater teacher flexibility and efficiency".

4.4.2 Developmental processes and construction of knowledge

A large portion of concepts used in environmental education have a scientific basis. Three traditions in educational psychology which have been used in the teaching of science in recent years are described by Driver (As cited in Osborne & Wittrock 1985:61):

- a) *the development tradition*. This tradition has emphasised age related restrictions on what learning can be expected of a child at a certain age;
- b) *the behaviourist tradition*. This tradition emphasises reinforcement and learning in small steps, building up increasingly complex skills and patterns of behaviour based on learning hierarchies - no age related learning stages are proposed;
- c) *the constructivist tradition*. This tradition rests on the view that a learner's existing ideas are all-important in responding to, and making sense of, stimuli. The learner makes sense of experience by actively constructing meaning.

The developmental theories of Piaget are widely used and referred to in educational circles, despite criticisms of convoluted explanations, paucity of argument and obfuscation (Phillips 1987). These theories are seen by the researcher to be related to the constructivist tradition because Piaget contended that:

- a) all knowledge is constructed by the individual as he or she interacts with the environment and tries to make sense of it; and
- b) all knowledge is acquired not by the internalisation of some outside given meanings but by construction from within, of appropriate representations and interpretation.

(Kamii and de Vries 1978 as cited in Osborne & Wittrock 1985)

Developmental psychology, as a sub-element of educational psychology, could prove to be invaluable in understanding how children develop internal representations of the natural world - an area of curriculum development that has not been fully researched within environmental education (Rejeski 1984).

Ausubel (cited in Novak 1978:4) maintained that the "most important single factor influencing learning was what the learner already knows." A similar concept was propounded by Piaget (Cited in Donaldson 1978:132) with his theories of *assimilation* and *accommodation*, where a person 'incorporates' new information into existing mental structures, or adapts the structures to fit new frameworks. Other researchers (Novak 1978; Driver & Bell 1986; Grundy 1987; Emihovich & Miller 1988) have also worked on developmental theories of learning relating to the construction of knowledge and meaning.

It was this supposition 'that each learner brings a background of experience or *context* to a learning situation' that the researcher felt should receive greater consideration in developing the programme at the GFEE Centre. It was also the researcher's view that this programme and many other such programmes in southern Africa had not paid sufficient attention to children's backgrounds when teaching them about the environment.

One of the aims of this research was therefore to 'contextualise' the GFEE Centre programme in an attempt to relate the teaching approaches, content and learning experiences to the localised needs of Standard 3 and 4 BaTswana children in Bophuthatswana. The need to critically evaluate environmental education programmes in a developing society is emphasised by Vulliamy (1987:11) in his study of Western teaching approaches to Third World communities:

Approaches to teaching about environmental concerns that have been successful either in Western schools or in non-formal Third World projects are unlikely to be effectively implemented in Third World schools. The perceptions of schooling in the Third World, together with the economic, political and social context in which it is conducted, present constraints that are very different. Unless these constraints are recognised, prompted reforms by environmental educators will at best, remain only at the rhetorical level and, at worst, prove counter-productive.

Central to any process of reflection on how children learn is a consideration of perceptions, knowledge, attitudes, values, behaviour and skills (Refer Section 2.1 & 2.2) that they bring into the learning experience according to the level of educational development reached. People's behaviour, attitudes and values are considered to be formed by the "norms, mores and folkways of social processes" (Bruner 1990:344-345). It is the researcher's opinion that

a person's perceptions and the resulting creation of meaning of a situation, within a specific context, are the key 'drivers' of behavioural responses.

Within the field of educational psychology there appears to be some disagreement on the relationship between learning and teaching (Brady 1985). Rejeski (1984) commented that environmental education's pedagogical malaise could result from the limitations of accepting existing educational practices and theoretical structures without generating its own theoretical basis. Clarity on this issue was important considering the aims of this research, because learning and teaching processes were to be examined.

Research into teaching styles of developed societies over the past two decades, has centred on two types of teaching behaviour - 'progressive' and 'traditional' (Refer to Appendix C), both of which are used in southern Africa (Macdonald 1990a:15). Socio-political processes have largely entrenched the traditional or 'teacher-centred' approach in the school systems of many developing societies. The researcher feels that this has greatly reduced the effectiveness of the educational system in southern Africa for the past forty years.

The applicability of Piaget's theories in a developing society were studied in a group of one-thousand BaTswana children by Mwamwenda and Mwamwenda (Mwamwenda 1989) who determined that the theories are valid on a cross-cultural basis, though certain minor differences were noted to exist. He also concluded that the systematic stages of development proposed by Piaget "are valuable in understanding Western science, mathematics and technology" (Mwamwenda 1989:70). The need to correlate environmental learning experiences being provided with the developmental level of the children being taught may be important within a Western context of learning (Deer & Kelly 1982). Consideration of these developmental stages is therefore important for those who have been entrusted with the responsibility of "preparing African children for their rightful place in an emerging modern society" (Mwamwenda 1989:71).

Piaget's theories with their relationships to both developmental *and* constructivist traditions, may be useful as the basis for an environmental educational approach. This does not

however detract from the usefulness and applicability of the theories of other researchers in this field such as Ausubel (Novak 1978; Bodner 1986).

4.4.3 Contextual issues in learning situations

The ecological and biological foundations of environmental education contain elements of science which are often used as the focus of environmental education syllabuses (Carson 1978). It was the researcher's opinion that the introduction of Western approaches to environmental education syllabuses in a developing society was a complicated process which required the participation of teachers in revising the syllabus and relating it to the environmental and social context of their particular community. The needs of that community had to be accommodated wherever possible. The social context of education is therefore explored in the following sub-section.

The relevance of Western educational approaches and systems in developing societies have been widely questioned (Knamiller 1983; Okot-Uma & Wereko-Brobby 1985; Eisemon 1989; Mwamwenda 1989), resulting in the modification or replacement of alien methods in some cases, where the education has been found to be irrelevant (Vulliamy 1987; Mwamwenda 1989).

Research in education systems led the researcher into the field of 'Sociology of Education.' An acknowledged view in this field is that education is culturally linked (Bilton *et al.* 1988; Giddens 1989) and that "schools exist for the purpose of inducting the young into the culture" (Stanley *et al.* 1956:14). Bilton *et al.* (1988:405) contend that the sociological concept of culture is influenced by a group's 'belief systems', knowledge and education:

Despite its superficiality, the culture of everyday interaction in all societies bears the imprint of more articulate and critical social myths and ideologies, knowledges and beliefs, whether they be drawn from the institutions of religion, magic, science, politics, education as primary ideas, or from secondary sources such as the media.

The researcher therefore views any set of inherent 'belief-systems' that a particular cultural group holds to be their 'original knowledge' or 'indigenous knowledge' (Gilbert 1990

pers.comm.). This viewpoint is seen by the researcher to be supported by Bilton *et al.* (1988:406) who describe belief-systems as:

those ideas that people hold to be right and true, which provide not only guides and rules for action, but also justifications for actions by which behaviour is made accountable to the self and others. ... Finally as propositions that claim to be in some way true, beliefs imply access to knowledge: they can be treated as 'knowledge claims', whether they be made generally or within the institutional contexts of science, magic, witchcraft or religion.

Education and information systems are used by societies to propagate these 'belief-systems' within and beyond a culture, and this may therefore be called 'indigenous education'. The Report of the Bophuthatswana National Education Commission (Bophuthatswana Government 1978) outlines the system of indigenous education that was used prior to contact with missionary groups in 1813, and which is present to some degree in today. The report comments that although the system of indigenous education "was non-literate it did meet the requirements of most systems of education." (Bophuthatswana Government 1978:6). Western approaches to education are considered to have had an impact on indigenous forms of education through the propagation of progressive philosophies. However, educationists have seldom given any thought to the changes that have had to be made to local systems in accommodating such different educational approaches (Macdonald 1990a). Mwamwenda's (1989) view on the subject is that 'indigenous' *environmental education* processes could have been more productive than modern initiatives in many cases. He argues that children in developing societies of Africa "learn a great deal about their environment" (Mwamwenda 1989:38), through indigenous education processes from a very early age.

Findings from this study might stimulate consideration for the role that indigenous education approaches could play in developing more culturally-sensitive environmental education approaches in developing societies.

4.5 SUMMARY OF PROBLEMS AND ISSUES

The institutional problems identified at the GFEE Centre have largely been attended to through administrative management procedures, and therefore will not be discussed any

further. The pedagogical issues raised by both Mahape's (1988) research and the Trainee Teacher's Workshops which were seen by the researcher to warrant further investigation may be summarised as follows:

- a). A predominantly 'teacher-centred' teaching approach used by the environmental education teachers;
- b). A cognitive orientation to the programme with a lack of teaching directed at affective behaviour;
- c). The irrelevance of many of the issues and examples used in the programme to BaTswana children; and
- d). The Western bias of the teaching approaches used.

These points led the researcher to undertake further, more intense study into the pedagogical issues in an attempt to assist in improving the GFEE Centre environmental education programme. The main body of research which follows contains the method of undertaking this research and the conclusions that were arrived at.

CHAPTER FIVE

DATA COLLECTION AND ANALYSIS

Many teachers seem to want to change their teaching, yet are often put off from doing so because it seems to be such an enormous task, and because they have no clear idea of where to begin. At the same time teachers have a sense of being isolated and alone, and as a result they feel hopeless and frustrated.

Davidoff & van den Berg 1990:1

5.0 THE RESEARCH PROCESS

During 1991, two groups of **practising** primary school teachers were invited to participate in workshops to analyse perceived problems with the Gold Fields Environmental Education Centre (GFEE Centre) programme (Refer Section 2.3.3), using an action research approach as previously described in Section 2.4.2 (Also refer to Figure 1.1 - highlighted blocks)

This chapter outlines the research process undertaken. During the course of the study a number of modifications were made to the intended research process as a result of issues raised and the need to explore these further.

5.1 WORKSHOP ONE

5.1.1 Profile of the participants - Workshop One

The first group of teachers was selected through the Department of Education's local Circuit Office, by means of a general letter of invitation to primary school teachers in the Mankwe Region only. A total of sixteen outside participants arrived for the workshop, representing standards 1 to 4, with most of these teachers being observed to be over forty years of age. A more accurate age profile was not obtained for this group, as it was not considered necessary at this stage of the research. Due to their maturity, it was assumed by the researcher that many of these teachers were trained in the old Department of Education and Training (Bantu Education) in South Africa (Nasson

& Samuel 1991:17&37), prior to the establishment of Bophuthatswana's own Teacher Education Colleges. Four of the GFEE Centre's teachers and one extension officer also attended.

5.1.2 Initiating the action research process

In an attempt to allow as democratic and unbiased an action research approach as possible (Carr & Kemmis 1983:158), **no formalised agenda or structure was followed** in the First Workshop. The participants were however introduced to the purpose of the workshop, which included an outline of problems with the GFEE Centre's environmental education programme identified by Mahape and Irwin (1988), as discussed in Chapter One of this thesis.

The group were then encouraged to discuss issues relevant to the topic under review. The group however, evaded any in-depth discussion of issues such as teachers knowledge of children's thinking and learning processes that the researcher attempted to introduce as possible discussion topics. After approximately one hour's faltering discussion the researcher found that the majority of the group continued to be reticent, and it became clear from general comment that the participants did not fully understand the process of research being carried out.

At this point the researcher realised that such limited and undirected dialogue was of little value, and was irrelevant to the focus of research. The approach to the action research process was then changed by the researcher, who confronted the group about their reticence. This openness broke the dead-lock and the group was asked what they would prefer to discuss, and whether *they* had any problems with the process.

During the ensuing discussion it was established that they had all attended the workshop under the false impression that it was to be a training course designed to make them better teachers, because the letter of invitation was vaguely worded.

The group was given the option to leave or to remain and participate in the research process. Comments from the group showed that many of them were apprehensive about being involved in 'research' because it was perceived to be a highly esteemed, almost mystical operation only undertaken by highly placed academics - not by practising teachers. This perception seemed to

evoke an element of suspicion amongst the teachers about the proceedings, with some teachers wondering if there was a hidden agenda. Others were merely sceptical of research in general, having often been required to fill in questionnaires, never seeing any of the results and then never being informed of the findings.

The process of action research was explained to them by the researcher and through this turned a potentially damaging problem into an opportunity. It was explained how action research could improve social or educational situations by helping participants to develop the ability to analyse situations, and through reflection enhance their ability to solve problems. Cohen and Manion's (1989) explanation of the action research process was used to persuade the group that they had the competence and ability to be involved in research.

After discussing the topic most of the group became convinced of the value of the process, and they agreed to continue with the research. The remainder, also agreed to stay on and were slowly drawn into the process as it progressed throughout the day.

The group were asked by the researcher, in a continuing 'spirit of democracy', how they would like to proceed with the research of the superficial issues identified. This was again found to be a problematic approach, as no suggestions were forthcoming from the participants. When the researcher deliberately refrained from leading the discussion, in an attempt to force dialogue and critical comment, the prolonged silences generated unease and dissatisfaction within the group. It was the researcher's feeling that the autocratic approach to education and training used in the South African Bantu system of education (Christie 1985) inhibited the participant's critical analytical potential - limiting the generation of creative comment when placed in such an unfamiliar situation.

5.1.3 Analysing the concept of the 'environment'

Intervention was eventually necessary to obtain progress. The researcher decided to guide the discussion to a point where the group could identify some problems which related to the teaching of environmental issues. This corresponded with Cohen and Manion's (1989:232) initiation of the

action research process: "The first stage will involve the identification, evaluation and formulation of the problem perceived as critical in an everyday teaching situation."

The participants were requested to divide into two smaller groups and discuss what the concept 'environment' meant to them personally, as the first stage in identifying environmental problems and issues. The following feedback was provided from the groups' discussions:

Table 5.1: Group generated meaning of the concept 'Environment'

Group One	Group Two
<ul style="list-style-type: none"> • Components include: Man made structures Mountains Trees Dams Rivers 	<ul style="list-style-type: none"> • Depends on the background of the person • A person's knowledge of the environment is positive or negative according to their background;
<ul style="list-style-type: none"> • Utilisation of resources ie. trees, dams & rivers 	<ul style="list-style-type: none"> • No positive or negative values attached, just pure knowledge and inter-relating with the environment.
<ul style="list-style-type: none"> • Some animals ie. domestic goats, donkeys & cattle. 	

These responses were found to be illuminating when the researcher compared them to a more generally applied description of the concept of 'environment' given by Irwin *et al.* (1986:28) : "The sum of all external conditions and influences affecting the life, development and survival of living organisms," given in a teacher's manual for Standard 3 and 4 Bophuthatswana Geography.

Continuing the research process, the researcher then elicited feedback on how the groups **felt** about the environment and the following statements were recorded in Table 5.2:

Table 5.2: Group consensus on ‘feelings toward the environment’

Group One	Group Two
<ul style="list-style-type: none">• Elements of the environment were to be utilised.• The environment is a functional, utilitarian concept.• Little emotion directed at the environment.• Killing is not an emotive issue.• Children used to kill birds as a game, but since western education was introduced, it is now discouraged.	<ul style="list-style-type: none">• Some negative ‘feelings’ towards the environment might exist in people nowadays, because of the failure (by authorities) to explain why things should not be done.• Positive ‘feelings’ towards the environment might stem from a loving explanation of the environment and the need to look after it.

These responses indicated that there was a possible dichotomy between utilitarian, traditional feelings to the environment, and emotionally based feelings held by many western groups, though this may have been a function of the artificial situation that the group found themselves in, in the company of B.N.P.B. officials. The group felt that utilitarian perspectives were changing as a result of modern educational influences which replaced traditional values but did not provide adequate alternative explanations or values.

Although the first group indicated that there was little emotion attached to the concept, the other group indicated that such ‘feelings’ might exist. As such it appears that attitudes and possibly some values (Refer Section 2.1) are attached to the concept, as shown in the comment in group two regarding ‘loving explanation’ and ‘the need to look after it’.

At this early stage in the study, the researcher began to feel that the issue of western and indigenous educational approaches (Refer 4.4.3) might warrant further investigation.

5.1.4 Analysing teachers’ concepts of ‘conservation’

When asked to comment on how they as adults interpreted the concept of ‘conservation’, the participants in their two groups responded with the answers shown in Table 5.3:

Table 5.3: Participant's interpretation of the concept 'Conservation'

Group One	Group Two
<ul style="list-style-type: none">• No inherent feeling of preservation.• The BaTswana looked at the benefits of using a resource.• With water there was a limited concept of pollution.	<ul style="list-style-type: none">• Means all the 'do not's' in nature ie.<ul style="list-style-type: none">- don't burn,- don't kill,- don't fish,- don't hunt.

As with the responses to the term 'environment', these responses were equally enlightening, in that they possibly contained a 'social comment' on their attitude to the over zealous law-enforcement activities of conservation agencies in the past. When these responses are compared to Irwin *et al.*'s (1986:28) widely used description of the concept of 'conservation': "Normally meaning the wise and rational use of the earth's resources with a view to achieving the highest quality of living for mankind, including future generations. Conservation is quite different from *preservation* which implies *not* using a resource" it would appear that there could be some misunderstanding about the concept.

Some members of the group commented about their confusion with the definition of the term *conservation* where their traditional 'utilitarian' approach was incorporated, whilst the contradictory approach of *preservation*, as used by the colonial authorities (Graham 1973) was also widely used as a synonym of conservation. The researcher clarified the differences, using current views on conservation that are widely accepted ie. Irwin *et al.* (1986:28) as quoted above.

The researcher's preliminary analysis of these three group sessions indicated that there appeared to be some confusion amongst the teachers regarding some of the fundamental concepts used in environmental education. Group One's responses seemed to have reductionist tendencies, dividing concepts up into discrete categories, whilst Group Two showed an holistic view of the concepts. Group One also appeared to view the concepts from a 'traditional' perspective, whereas Group Two's responses indicated that they had possibly been exposed to some environmental education activities that stressed the affective component of the concepts.

The responses from this session also seemed to show that the groups had some form of values that related to the concept of 'conservation', although this was either poorly expressed or underplayed. The comments about the 'do nots' of nature may be related to the first remark by Group Two in the previous section, regarding 'the authorities failing to explain why certain things may not be done' (Refer Table 5.2). Value systems are usually developed through informed reflection on alternatives and choices; benefits and disadvantages; standards and norms (Refer Section 2.1). Should inadequate information or understanding exist to create informed reflection, a person may develop inappropriate values for that context, or merely suspend the development of such values. This may have been the case with the teachers in this workshop, or with children who have been required to develop such values relating to the environment.

It was therefore concluded by the researcher that the teachers had not been adequately exposed to basic environmental education or ecological concepts, and that this could reduce the effectiveness of their teaching practice.

5.1.5 Investigating children's perceptions of the environment

As a second stage in the process the two groups of participating teachers returned to the previous discussion about their own knowledge of children's learning and thinking processes. They attempted to formulate a framework or '**construct**' of how their pupils perceived the two concepts of environment and conservation.

The exercise stimulated a great deal of debate. A group of elderly male teachers were adamant that children, if asked to describe their perceptions of the environment, would only include man-related or unnatural features such as roads and fences, whilst a group of mainly female teachers vigorously contested this narrow perspective, contending that children would give a balanced description of the environment, including both natural and man-related features.

In an experiment to test the issue, the teachers requested a number of Batswana school children, who were at the centre on an environmental education course at the time, to write down their ideas of the two concepts. Three boys and three girls in standard 4 were chosen from the course at

random, with the permission of their accompanying teacher, and asked to write down in essay form how they perceived the concepts of **environment** and **conservation**, with no prompting from the teachers. *The children were not given any prior instruction or information on the two concepts by the participating teachers, but were expected to give their own existing comprehension of the concepts.*

5.1.5.1 Teachers' views on children's perceptions of the environment

Their answers were then analysed by both groups of participating teachers together. The children's information relating to the concept of the **environment** was interpreted through content analysis (Refer Section 3.4) by recording the total frequency with which natural and man-related elements were given in the children's six replies combined, as shown in Table 5.5:

Table 5.4: Frequency of mention: natural & man-related elements in the concept 'environment'. (Standard 4 pupils)(N=6)

Man-related elements		Natural elements	
Items	Number	Items	Number
Schools	6	Wood/bushes	6
Roads	5	Mountain	5
Shops	5	River	4
Villages	3	People	3
Fences	3	Wild animals	3
Buildings	3	Veld	1
Water tank	3	Erosion Veld	1
Hospital	2	Grass	1
Domestic animals	2	-	0
Houses	1	-	0
Misc.	4	-	0
Total	<u>37</u>		<u>24</u>

A comparison of the two total frequencies of man-related items (33) and natural items (24), showed that the difference between the two categories of 'natural element' and 'man-related elements' was significant enough to warrant further enquiry.

The children were also asked to give an essay answer on their comprehension of the concept of **conservation**, again with no instruction, prompting or information being provided by the participating teachers.

5.1.5.2 Teachers' views on childrens interpretation of 'conservation'

The children's contributions on the topic of conservation, which were given in essay form were analysed by the two groups of teachers together, looking at each of the elements and activities described as discreet entities.

Table 5.5: Frequency of response per category: concept of 'conservation' (Standard 4 pupils)

Description	Frequency
Don't kill birds	4
Protect trees, soil	4
Don't burn indiscriminately	3
Erosion control	2
Regulations about nature/don't	2
Animals need to live/anti-poaching	2
Protection of resources	1
Limit animal numbers	1
Future generation rights - to see animals	1
Plant/replace trees	1
Protection of houses	1
Parent/child relationship	1
God/religion	1

It was noted by the researcher that the concept of 'wise-utilisation of things or resources' was not mentioned, despite the fact that this was the definition given in the Standard 3 Geography textbook (Irwin & Lehobye 1985) and the Standard 4 Geography textbook (Irwin & Lehobye 1986), both of which were used in much of the Bophuthatswana schooling system.

Some of the participating teachers commented that the responses could indicate that the children displayed a limited understanding of the concept, although other teachers indicated that the children may have misunderstood the requirements of the study. The researcher's immediate impression of these results was that the children had not been adequately taught the concept at school, resulting in their limited or confused understanding of the concept. Upon reflection however, the researcher concedes that the 'unusual' circumstances of the test could have influenced the children's responses.

An analysis of the answers did highlight that many of the children had developed some values that related to the environment ie. protect trees and soil, let animals live, people have a right to see animals in the future. Such answers may also be used to comment on their attitudes to the environment, where knowledge, feelings and an action tendency are displayed (Refer Section 2.1.2) ie. animals need to live and anti-poaching methods should be used to protect them. A review of Table 5.5 indicates that many of the attitudes displayed in the responses may be classified as positive, and could indicate that their particular school had an active environmental education programme. the fact that they were attending an environmental education course at the time could also have influenced their thinking.

Language was not seen to be a problem with the generation of data or analysis of content in this instance because the children were allowed to write their answers in Setswana or English, with the limited instructions having been given in both languages also.

The general response by the teachers to the children's answers was varied however, possibly indicating that the teachers also had a confused understanding of the concepts. They did note however that water, which is a problematic resource in some rural areas, was not listed or seen to be significant under the conservation topic.

These varied responses from the teachers tended to reinforce the researcher's impression that environmental and ecological concepts were not well understood by the teachers who were involved in teaching environmental studies or related subjects in schools.

5.1.5.3 Teachers' suggestions to improve the GFEE Centre programme

A number of suggestions were made by the teachers with regard to improving the teaching approaches used at the GFEE Centre. These included:

- adoption of a 'total child' teaching style;
- use of an inter-disciplinary (cross-curricular) approach;
- accommodating the different age and development levels of children;
- sensitivity to language or medium of instruction;
- teachers should be involved in curriculum development process.

5.1.6 Evaluation of the first workshop

The evaluation of the First Workshop's research consisted of three elements: firstly, an evaluation of the day's proceedings by the workshop group at the end of the day; secondly, extensive critical reflection by the researcher himself, and; thirdly, a discussion of the workshop with colleagues and the supervisor of this research in which the strengths and weaknesses of the approach and findings were discussed.

5.1.6.1 Teachers' evaluation

The final evaluation section of the workshop concluded with the participating teachers commenting on the fact that their lack of clarity about children's environmental perceptions or 'worldviews' could be a serious problem - reducing the effectiveness of their educational efforts in schools.

The participants also indicated the following points of concern, which the researcher noted to help plan the next workshop:

- teachers from the Bophuthatswana Department of Education had a limited knowledge of the development of curricula, and the fundamentals of the psychology of learning, and therefore complex terminology and concepts were problematic when used;
- an unstructured approach to research processes was unsettling to the participants;
- teachers possibly had a limited impression of what pupil's perceptions of the environment and conservation really were.

5.1.6.2 Researcher's personal reflections

Reflection on the research process as a whole led the researcher to the following conclusions:

- a purely open-ended or democratic approach to action research (Kemmis 1988) was limiting, given the participant's and researcher's inexperience with research processes, together with the time constraints that the researcher experienced with his employment;
- the next workshop should be more clearly outlined as to its purpose so that the participants would feel more confident to participate, and so that more effective use of time could be achieved;
- the written invitation to teachers should be clearer and more specific so that potential participants would realise that they were to be involved in research;
- with more clearly defined perceived problems given to the participants at the beginning of the workshop it was necessary to be constantly aware of remaining neutral during the facilitation of the workshop so that the validity of the results would not be jeopardised through manipulating the discussion;
- discussion on programme development theories should be omitted, and that future workshops should focus immediately on the issues of teaching approaches, learning processes and children's perceptions of the environment.
- the teachers' own perceptions of the environment should be pre-established, so that the research process do not confuse those perceptions with those of the childrens.
- the structure of the groups should be noted with a view to monitoring the group dynamics ie. power relationships between headmasters and teachers (Refer Section 5.1.5).

5.1.6.3 Critical review by supervisor and peers

The results of the First Workshop were critically reviewed during a feedback session held with one of the supervisors of the research and a number of environmental education staff of the B.N.P.B.

. Their critical comment indicated the following:

- no significant meaning should be assigned to the results of the small study done on the six pupils, due to the small sample size used;
- this workshop should be used as a 'pilot' from which insights and experience could be gained
- an additional workshop should be planned due to the lack of focus obtained during the workshop.

A second Workshop was therefore held which incorporated the findings of the First Workshop where possible.

5.1.7 Summary of issues raised

Some of the teachers had a very limited understanding of the concept 'environment', limiting it to individual items such as donkeys, trees etc. Others had a wider though still limited perspective either based on utilitarian views, defining it as 'knowledge and inter-relating it with the environment ... depending on a person's background' (Refer Table 5.1). In terms of currently accepted scientific ideas of conservation the teachers displayed a limited understanding of the concept, claiming that the BaTswana have no inherent view of preserving resources, but indicated that it had come to be seen as an authoritarian or restrictive concept with some negative feelings toward it in some communities.

Analysis of the BaTswana children's essays indicated the children could be unclear about the concept of the environment, tending to favour the mention of man-related items. They also appeared to have a confused understanding of the term 'conservation' despite its being defined in school text books.

5.2 WORKSHOP TWO

5.2.1 Modification to action research approach

Due to the limitations found in the First Workshop, the researcher decided to hold two more workshops in order to obtain further data which might increase validity and reliability in the research. A few changes to the approach used in the action research process were also made to accommodate constraints on the research.

The time frame of approximately twelve months set for the total research process, together with work loads experienced by school teachers towards the end of the data generation period suggested that a modified form of action research was necessary. Grundy (1987:152) commented that a **practical action research approach** was noted to have "prudent action" as its intended outcome.

The improvements generated through this approach would be largely individual, with an increase in perception and understanding going hand in hand with the improvement of individual practice. The theory indicated that there would be no improvement in the wider context of national educational practice though. In this approach the practitioner and any participant is not "merely participating through commitment to the proposals upon which the project proceeded, but generating his/her own knowledge, and controlling its application" through the use of personal judgement (Grundy 1987:152).

This approach was seen by the researcher to be different from the emancipatory approach in that it did not make any change to the "power relationships implicit in the social practice" of the participants (Grundy 1987:148) through a more intensive involvement from the researcher who monitors broader social change as a result of modified power structures (Carr & Kemmis 1983). The researcher found that it was not possible to enhance the emancipatory aspects of the process with school teachers due to time and geographical constraints.

The action research process followed for the subsequent part of the research was modified to that of 'practical action research' as outlined by Grundy (1987), *but with the constant awareness by the researcher that this more limited approach could be viewed as manipulative.*

5.2.2 Profile of participants - Workshop Two

The second Workshop group consisted of fifteen primary school teachers, eight women and seven men, who taught standards ranging from 1 to 4 (Refer Table 5.6). This group was selected through the local education circuit office, with the letter of invitation being clearly worded that the workshop was part of a research process. This aspect was however not over-emphasised due to a fear of intimidating the participants, who were not accustomed to participating in such processes.

The dominant group in the workshop (See Appendix D, Analysis of Group Dynamics) consisted of elderly male headmasters, who within the Bophuthatswana Educational System have developed a reputation for strict, authoritarian control of schools. It was also established that two of the teachers who attended this workshop were not directly involved in teaching environmentally related

subjects, but were specialist language or mathematics teachers. This factor was noted by the researcher as a possible detractor from the validity of their input into the workshop.

Table 5.6: Profile of participant teachers : Workshop Two.

Age group	No. of teachers	No. heads of schools/dept.
20-29	1	-
30-39	5	-
40-49	4	2
50-59	-	1
60-69	-	2

Standard	Number of teachers
1	1
2	2
3	2
4	2
9	1

5.2.3 Action research process - Workshop Two

The second workshop was held on the 26 March 1991 at the GFEE Centre. With the experience gained from Workshop One, as outlined in Section 5.6.0, a practical action research approach was adopted with the following programme:

- Introduction and orientation to environmental education and action research;
- Exploration of participants' own environmental perceptions;
- Examination of participants' level of understanding of learning theories and teaching approaches;
- Investigation of participants' understanding of children's perceptions of the environment and environmental issues;
- Closure and evaluation.

5.2.3.1 Introduction - Workshop Two

A short introduction to the research reduced participants' fears and anxieties about the process, and included a brief overview of environmental education by the researcher. A summary of Mahape and Irwin's (1988) research findings on the GFEE Centre programme was also covered.

The approach adopted to initiate debate in the second workshop was to focus immediately on the topic of environmental education with the related issues experienced at the GFEE Centre. This allowed the participants to centre their thoughts and debate around problems they had identified in the overview. This modified approach was seen by the researcher to facilitate the action research process (Refer Section 5.2.1).

5.2.4 Participants' understanding of learning processes

The second stage of the workshop was used to establish the level of understanding that participants had of learning theories. The complexity of exploring children's observational skills, memory capabilities, perceptions, and their stages of psychological development and then relating these to cause-and-effect relationships could become very confusing and embarrassing for people not versed in the terminology and concepts involved. The researcher felt that a high level of confusion about terms and concepts could have been detrimental to the effectiveness of the workshop and its outputs.

The group then discussed the topic of learning processes which allowed the researcher to gauge the level of debate that could be expected during the workshop. The discussion also acted as an 'ice-breaker', encouraging individuals to contribute to the debate. The group reviewed in general terms, what happens in the process of learning. Elementary discussion centred around aspects such as the development of psychomotor skills; the creation of understanding; self-discovery and acquiring new knowledge. Educational terminology such as 'stimulus and response' or 'positive reinforcement' (Skinner 1968) was not used by the group, and very few concepts such as 'Bloom's taxonomy of educational objectives' (Bloom 1956) or 'stages of cognitive development' (Mwamwenda 1989) were discussed. The work of major educational theorists such as Rogers, Skinner, Gagne, Bloom, Ausubel, Bruner, Piaget were similarly not mentioned.

In the wider context of education the teachers felt that learning brought about changes in a learner's attitudes and behaviour. In the process of stimulating discussion the researcher asked the question 'What is the purpose of behaviour change in education?', the group's responses were summarised as follows:

Table 5.7: Teachers' responses to the question 'What is the purpose of behaviour change in education?'

- to build up the child;
 - to suit society;
 - to create a well moulded adult;
 - child must not be a future burden on society;
 - develop a moral being.
-

The researcher felt that these responses tended to indicate that the teachers were viewing the educational process from a sociological perspective, which predominantly addressed the needs of society, and did not place emphasis on the individual learner and his or her needs. The roots of this perspective could possibly be traced to the teachers' training and the influence of Christian National Education and fundamental pedagogics. Gluckman, in her study of fundamental pedagogics cited in Ashley (1989:9), found that the educational writers she surveyed viewed childhood in a negative way and as being deficient. She thus claimed: "This deficiency is remedied by an orientation towards adulthood. Thus the belief that adulthood is the aim of education is a theme constantly emphasised." Ashley also comments that the Christian National Education approach is often described as one of 'moulding' children into the image of their adults founded on Christian and National values through the authority of the teacher.

Mwamwenda (1989:5) describes educational psychology as "providing information on how learning is acquired, the circumstances necessary for learning to occur, and the effect of learning on an individual pupil and society as a whole." The group showed a collective understanding of educational psychology when they attempted to clarify the relationship between education and learning as shown in Table 5.8:

Table 5.8: Teachers' responses to the question 'What is the relationship between learning and education?'

- the interaction between the learner, the educator and the learning material;
 - the development of cognitive and affective domains;
 - the development of values and norms;
 - that everyone is unique and learning is centred around the individual; and
 - each person sees (perceives) things differently.
-

The researcher noted that **together** the group was able to provide a rudimentary explanation of educational concepts and learning theories, however no individual teacher appeared to have a good grasp of the basic theories. When pressed to expand on these concepts and learning theories the teachers were not able to provide further details. This indicated to the researcher that the teachers had possibly been exposed to the concepts in training, but had either not fully understood them or had not used them as a matter of course in recent teaching practice.

A comparison of the responses given in Tables 5.7 and 5.8 and the perceived lack of in-depth understanding of the concepts and theories could indicate that the teachers' generally adopt a behaviourist approach to teaching and learning situations designed to 'build', 'create', 'suit' and 'mould.' Although Table 5.8 appears to convey an understanding of a more liberal approach to education (Ashley 1989)(Refer Section 2.5), it was the researcher's impression during the workshop that the teachers felt more comfortable with the Christian National Education or Fundamental Pedagogic approach to education.

Knowing that the individuals in the group only had a rudimentary knowledge of the technical aspects of educational psychology, the researcher realised that he had to facilitate complex issues that arose in debate. The researcher limited his use of complex academic terms and concepts, or explained these where necessary, allowing all the participants to understand and contribute freely.

5.2.5 Participants' own perceptions of 'environment'

The evaluation of Workshop One (see Section 5.5.6) indicated that it was necessary to ensure that the participants' discussion and interpretation of children's perceptions of the environment was not confused with their own inherent perceptions of the environment. The researcher considered that it would be necessary to establish this base-line data as early in the workshop as possible in case it should be needed at a later stage in the data analysis to clarify discrepancies or act as a form of 'control.' Each participant wrote down what *their* immediate thoughts or perceptions of the environment were, and what the concept of conservation meant to *them*, personally (Refer Table 5.9).

Table 5.9: Frequency of mention: natural & man-related elements in concept 'environment'. (Teachers' own perceptions)(N=15) Workshop Two

Man-related elements		Natural elements	
Items	No.	Items	No.
Houses/Buildings	14	Natural things	22
Litter/pollution	14	Wild animals	18
Farming items	11	Trees	14
Cultural items	10	Soil	14
Work place	6	Plants/bushes	14
Roads	5	People	12
Domestic animals	4	Water/rivers	9
Gardens	4	Erosion/dongas	7
Hospital	2	Wild birds	7
Town/village	2	Grass	3
School	2	Mountain/kopjies	3
Money	2	Land	3
Police	2	Air	2
Misc.	<u>14</u>	Misc.	<u>5</u>
Total	<u>92</u>		<u>135</u>

A basic analysis of this group's answers shows that they would be more likely to mention natural items (59%) in their perception of the environment than unnatural or man-related items (41%). The skewed response is interesting considering that the teachers generally had access to the Bophuthatswana schools' official teacher's manual (Irwin *et al.* 1986) which provides an holistic overview of the concept of the environment.

5.2.6 Participants' views on children's perceptions

The teachers in this group chose not to complete individual outlines of what they thought children perceived as items or issues within the environment, but chose rather to do this in small groups. The researcher felt that they chose to complete the exercise in this manner due to a lack of confidence in their own perceptions, and preferred to develop these within a group context.

During discussion on what the participants understood BaTswana children's perceptions of the environment to be, a number of related issues were raised by the teachers about factors which could possibly shape the children's constructions of reality. Table 5.10 summarises the points made.

Table 5.10: Teachers' views of the factors that influence BaTswana children's perceptions of the environment. (Workshop Two)

- a. BaTswana people have different worldviews of the environment from western people;
 - b. The western schooling system, together with the authoritarian approach used by teachers forces children to accept certain principles and practices which are experienced differently at home;
 - c. The use of different languages to that of the mother tongue as a teaching medium, was seen to create tension in children;
 - d. There was a consensus of thought that BaTswana children experience internal conflict in reconciling what is taught in the western system of education and that which is passed on as cultural education at home. This was described as a form of daily 'culture shock'.
-

An anecdote was provided by a teacher which illustrated some of the conflict experienced by some children caught in such a transition:

A black boy and a white boy could be playing in a neutral bushy area. The boys become hungry and they find a bush with fruit on it. The white boy wants to eat the fruit, and the black boy says that they should not eat it because in his experience at home such fruit is not good. The white boy says that they should eat it, and therefore the black boy has difficulty in refusing to eat the fruit.

The implication of this anecdote was explained by the teacher to be that the white boy was able to persuade his black companion to act against his inner conviction because the white child had the 'correct western knowledge'. Such perceptions were considered to exist amongst black schoolchildren, and therefore were seen by the teacher to have an influence on teaching practice.

The group, working in two sub-groups, attempted to analyse and identify those components and concepts which BaTswana children included in their perceptions of the terms 'environment' and 'conservation', indirectly indicating how children would respond according to their background and experience within a particular environment. Lewin (Cited in Mwamwenda 1989) would have

connected these responses to the child's *cognitive field*. The combined report-back of the two sub-groups provided the following summary:

Table 5.11: Teachers' views of Standard 3 & 4 BaTswana children's perceptions of the environment. (Workshop Two)

- Children have different perceptions of the concept depending on their experiences with the environment ie. rural children will tend to include natural elements such as animals, plants and fields; whereas urban children will be more inclined to include man-related elements such as factories, shops, tennis courts and cinemas.
 - Children will include natural vegetation, types of soil, and different kinds of animals in the concept;
 - The SeTswana term for environment is '*tikologo*' and when taught this concept, wild and domestic animals are included in it;
 - Children will talk about how animals adapt for protection and survival.
-

The group noted that school children were taught about the environment in varying degrees from standard 2 to 4, thereby influencing their concepts in various ways. Although this is a pertinent point, the researcher queries the effectiveness of this influence if the teachers themselves only have a vague understanding of such concepts (Refer Section 5.1.5.2). Some of the participants claimed that children think negatively about their environment because they continue to pollute and to litter despite lessons to the contrary.

The point was also made by the group that the most efficient way of determining children's perceptions would be to discuss the issue with a group of children directly.

In the conclusion to their workshop, the group commented that BaTswana children would not originally or fundamentally see the environment differently to other (western) children, but would be influenced by the circumstances in which they would find themselves, depending on the rural or urban context. It is interesting to note that other researchers have come to similar conclusions.

O'Donoghue (1987b:16) argues that people have differing perspectives depending on the situation they find themselves in, and quotes Berger and Luckman (1967) to support his point:

The validity of my knowledge of everyday life is taken for granted by myself and others until further notice, that is, until a problem arises that cannot be solved in terms of it. As long as my knowledge works satisfactorily, I am generally ready to suspend doubts about it. In certain attitudes detached from everyday reality ... I may perhaps doubt elements of it. But these doubts are 'not to be taken seriously' ... Only when my maxims fail 'to deliver the goods' in the world to which they are intended to apply are they likely to become problematic to me 'in earnest'.

O'Donoghue (1987b:15) further comments that it is "therefore not surprising that most rural and urban people do not share similar conservation perspectives or the same environmental awareness."

The group also concluded that the school system might introduce a degree of complexity and confusion into what was originally a child's coherent and holistic worldview of the environment. This led the group to contend that the BaTswana child would not automatically associate the word **environment** with its SeTswana equivalent - **tikologo**. They felt that the child would 'listen with different ears' and consequently create or construct a different meaning for the word **environment** to that of **tikologo**. The GFEE Centre teachers even went so far as to say that the children would associate the word **environment** with National Parks only.

The teachers also felt that children did understand the processes that existed in the natural areas around their homes and that they would also understand the term 'conservation' to mean using resources wisely from lessons given at school. This conclusion varied from that of the group in Workshop One (See Table 5.5) where this fundamental concept was omitted.

5.2.7 Teachers' suggestions to improve the GFEE Centre programme

The group felt that a number of issues could be addressed to improve teaching practice at the GFEE Centre. These were:

- include practical nature conservation activities in the programme;
- include more effective field work with children;
- stimulate children to ask more questions;

- create better links between learning experiences and school syllabus;
- relate elements of textbook to actual objects (ie. pictures to objects);
- use more creative writing in programme;
- use Film-vans to create a better link with GFEE Centre programme and schools.

5.2.8 Evaluation of Workshop Two

The evaluation of this workshop, like the first, consisted of three parts: participant's critical analysis of the workshop, the researcher's own reflections on the process and a peer review by the colleagues and one of the Research Supervisors.

5.2.8.1 Participant's evaluation of the workshop

The participants indicated that they felt at ease with the workshop process once the approach and details of the day's programme had been explained. The group indicated that the workshop had stimulated them to think more deeply about environmental issues and how these could be related in a practical sense to the classroom. The general impression given to the researcher was however, that they expected the B.N.P.B. to visit their schools to carry out the practical teaching for them.

5.2.8.2 Researcher's critical reflection

Reflection on the workshop by the researcher showed that the depth of discussion used to investigate the group's level of understanding about learning processes was possibly unnecessary. Experience with the group showed that it was more profitable to explore participant's teaching experiences with children relating to environmental issues, and also to investigate their understanding of children's thinking, perceptions, feelings and attitudes about the environment, than to waste too much time on peripheral issues.

Observations of the interpersonal relations between the various teachers gave rise to concern that group dynamics had influenced the discussion processes and possibly reduced the validity of any conclusions made (Refer Appendix D). Dominant personalities and authority figures, such as

headmasters, gave the impression that their opinions were in fact the group's feelings, consequently giving a bias to the data recorded.

The presence of one or two teachers not directly involved in teaching environmentally related subjects also tended to confuse the discussion at stages.

5.2.8.3 Review by supervisor and peers

The problems of group dynamics and teacher's backgrounds were raised at a Research Evaluation Seminar in Mmabatho, which the Research Supervisor attended. The workshop participants recommended that the teachers invited to Workshop Three should be teachers involved in environmentally related subjects, and should if possible NOT include school principals. It was also recommended that the participants should be practising teachers from varied backgrounds, age-groups and school types.

5.2.9 Summary of issues raised in the workshop

The teachers' own perceptions of the environment, in this group, indicated a predominance of natural elements as compared to man-related elements (Refer Table 5.9). This was possibly due to the fact that most of the teachers were directly involved in teaching environmentally related subjects at some point during their school duties.

This group of teachers felt it important to indicate that they felt that there was a tension that was created within BaTswana school children due to the differences in culture that existed in the children's home environment and that of the western orientated education system in school (Refer Table 5.10). The teachers' views of children's perceptions of the environment indicated that the perceptions would be dependant upon the children's background and experience, with rural children having a worldview that is associated with nature, and urban children having worldviews linked more closely to man-related elements (Refer Table 5.11). They felt however that children would usually have some balance between the two extremes. The tendency for certain elements of the environment to be focused upon could provide insight into children's perceptions as indicated in the studies aims (Refer Section 1.2).

This group raised the issue of language often creating problems, especially where 'English as a second language' was the medium of teaching. This was seen to create differences in understanding where concepts were taught in one language and conceptualised in another. It was also interesting to note that this issue was supported by the teachers from the GFEE Centre, who appeared to have had experience with children having difficulties in relating similar concepts across language barriers. Of particular note was the feeling that children only relate environmental concepts taught to a National Park context, and not to their home situation.

5.3 WORKSHOP THREE

The original research proposal had indicated that only two workshops were to be held. As is the nature of action research, a number of issues arose which warranted further investigation and in addition, a small research project was carried out by one of the GFEE Centre teachers (Refer Section 5.4) following similar approaches to those of the main research.

5.3.1 Modifications to action research approach

The 'practical action research' approach (Grundy 1987) used in Workshop Two was retained and used in this workshop, *but again with the constant awareness that this approach could be viewed as manipulative, and consequently all efforts were made by the researcher not to influence the proceedings unduly.*

5.3.2 Profile of Workshop Three

Workshop Three consisted of eight teachers, who were a specifically profiled group which included a number of younger teachers, all of whom were invited through the local Circuit (Refer Table 5.12). Each teacher was required to be actively teaching environmentally related subjects such as environmental studies, nature studies, or biology. Some of the group had graduated from Bophuthatswana's Teacher Education Colleges which are operated independently of the South African education system. The profile of the group was noted for comparison with issues that arose from group dynamics in other workshops. The group's profile is shown in Table 5.12.

The participant who taught Standard 9, was invited by the staff at the GFEE Centre because he was a known Lengau Conservation Club leader who had interacted with many primary school children on practical environmental field-trips, and it was felt by the staff that his contribution to the proceedings would be valid. The group size was also kept small because it was felt that a smaller group would encourage more interaction between the participants.

Table 5.12: Profile of participant teachers : Workshop Three.

Age group	No. of teachers	No. heads of schools/dept.
20-29	2	-
30-39	3	-
40-49	1	1
50-59	-	-
60-69	1	-

Standard	Number of teachers
1	1
2	2
3	2
4	2
9	1

Two teachers from the GFEE Centre, together with the local B.N.P.B. Regional Environmental Education Officer also attended. Unfortunately the GFEE Centre staff were called out at intervals to attend to visiting school groups who were attending a programme at the GFEE Centre.

5.3.3 The action research process - Workshop Three

This workshop was initiated in a similar manner to the previous one with the participants writing about their own ideas on the environment. When this had been completed, a brief overview of environmental education, and a description of identified problems with the GFEE Centre programme was covered by the researcher. A description of the action research process was also given to gain the participants' understanding and acceptance of the approach.

5.3.4 Teachers' own perceptions of 'environment'

As in Workshop Two, the participants were asked to write down their own ideas and thoughts on the concepts of 'environment' and 'conservation', to be possibly used as a form of control or comparison with their thoughts on children's perceptions of the environment (Refer Table 5.13).

Table 5.13: Frequency of mention: natural & man-related elements in concept 'environment'. (Teachers' own perceptions)(N=8) Workshop Three

Man-related elements		Natural elements	
Items	No.	Items	No.
Roads	4	Wild Animals	9
Litter	3	Natural things	9
Dumpsite	2	People	7
Houses	1	Soil	6
Dams	1	Erosion/dongas	5
Villages/towns	1	Trees	5
School	1	Grass	4
Farmyard	1	Plants/bushes	2
Domestic animals	1	Wild birds	2
Church	1	Land	2
Food	1	Water/river	2
-	<u>0</u>	Flowers	<u>1</u>
Total	<u>17</u>		<u>54</u>

An analysis of Table 5.13 showed that the teachers mentioned a higher frequency of natural items (76%) than they did man-related or unnatural items (24%) in their view of the environment. Again this skewed description of the environment is interesting considering their access to the official teacher's manual which gives a definition of the concept (Refer Section 5.2.5). The higher percentage of natural items given by these teachers could be ascribed to the fact that these teachers were all known to be active in the teaching of environmental subjects.

5.3.5 Teachers' suggestions to improve the GFEE Centre programme

In keeping with the researcher's personal evaluation of Workshop Two (see Section 5.2.3.5), the approach to the action research process in this workshop was focused on a more direct analysis of teacher's experiences of children and their learning needs.

The participants were therefore asked how they felt they could assist in solving some of the problems identified with the Centre's programme. The points raised during discussion were noted and a number of relevant issues relating to the context of children's backgrounds, cultural frameworks and existing indigenous knowledge were then used to guide discussion. The following suggestions were made:

- teachers need to know the motive for teaching a particular concept/subject;
- the image of ecology/conservation needs to be improved (ie. used as punishment in some schools where litter collection is called conservation);
- school teachers should be guided to realise the benefits of lessons at GFEE Centre;
- school visits should be related to satisfying the needs of school syllabuses;
- evaluation of each visit should take place;
- support resources should be developed to aid school teachers;
- school teachers should be involved in the GFEE Centre programme for continuity;
- child-centred teaching should be used at the GFEE Centre;
- children should be involved in practical learning experiences;
- a more holistic approach needed to integrate different subjects (ie. cross-curricular);
- use appropriate teaching language.

The teachers also commented that in general many of their colleagues "don't know about the concepts of the environment or ecology, and therefore can't follow up on visits (to the GFEE Centre - researcher's inclusion) in school lessons". The teachers also commented that some teachers even queried why ecology was taught in schools. Their general consensus was that the two concepts were widely viewed to be very complex, and teachers therefore tended to pay them little attention. It is the researcher's view that ecology and the attention given to environmental issues are relatively recent phenomena and as such are unfamiliar to teachers who graduated or qualified more than twenty years ago. The B.N.P.B. environmental education programmes have attempted to redress this situation during the past ten years through interaction with the Department of Education and its In-service Training Programmes.

5.3.6 Teachers' views on children's perceptions

In accordance with action research principles the participants decided to comment as a group on the issue of how BaTswana children perceive the environment. Each teacher was asked to comment in turn, and a number of issues were raised. One important point that was debated indepth related to the relationship between any items or features that existed in the immediate context of a child, and those items mentioned in a child's description of his or her environment. It was felt that there would always be a strong likelihood that those items which existed in the immediate vicinity of a child would be mentioned first in any description.

The question of language and interpretation was considered and was seen to be related to the amount of explanation afforded terms such as 'environment' when introduced and used by the teacher. The group summarised their discussions as shown in Table 5.14.

Table 5.14: Teachers views of Standard 3 & 4 BaTswana children's perceptions of the environment (Workshop Three)

- a. The individual child's needs and interests would be reflected in the description of the word 'environment'.
 - b. Children work from the known to the unknown - they would usually link the term 'environment' to the immediate surroundings they find themselves in despite any rural or urban background influence, they would think of the closest and most familiar things at hand ie. fences, home, cattle, which would be the most often quoted items. These items chosen would tend to change depending on the degree of linkage given by the teacher in the classroom.
-

The researcher feels that such a simple answer to the issue posed to this group may not be entirely accurate. Whereas children might tend to use some readily recognisable visual clues within their in the construction of a particular worldview many children would also draw on items, concepts and frameworks that extend beyond the immediate context. This should be true especially of children that conform to the age groupings seen to be the norm for standards three and four in

Bophuthatswana (Refer Table 4.3), whose levels of psychological development equate to Piaget's 'concrete operational' or early 'formal operational' stages (Brady 1985:101) where children are able to classify, reason and consider hypotheses about abstract ideas.

The researcher suggested that the group explore any connections between issues raised in Workshops One and Two and their own points of view, to determine if there were areas of commonality or agreement between the various groups. These issues were introduced by the researcher as casual questions within the context of the discussions.

The first issue raised was one which related to linguistic difficulties that possibly caused different perceptions across cultures about a common concept. This particular issue related to the feeling from participants in Workshop Two who maintained that BaTswana children would have different perceptions of the meaning of 'environment' and 'tikologo' (see Section 5.2.3.4). The group's conclusions are summarised in Table 5.15:

Table 5.15: Answers to question 'Do standard 3 & 4 BaTswana children perceive the concept of the English term 'environment' any differently to the term 'tikologo' in SeTswana?' (Workshop Three)

- a. Children at that age do not see cultural differences;
 - b. There would be no real differences placed on the words from a social perspective;
 - c. Children are naturally inquisitive and would want to find out the meaning of the words, thereby clarifying their common meaning;
 - d. Children do not place any greater or lesser significance on the term just because it is English.
-

This group felt that BaTswana children would not have different interpretations of the two words, which contradicted the opinions of the participants in Workshop Two (Refer Section 5.2.3.4).

The researcher tried to explore the cultural aspect of learning and perception further with the group, in an attempt to clarify the above apparent opposing views of the participants in Workshop

Two and Three. The group was therefore asked to comment on the possibility that 'indigenous knowledge and education' (Refer Section 4.4.3.1) created some differences in meaning and understanding when integrated with western education systems. The group's comments are summarised in Table 5.16.

Table 5.16: Answers to question 'Does indigenous knowledge place a different connotation on the meaning of certain concepts?' (Workshop Three)

- a. Indigenous knowledge is not well linked into the western school system at present;
 - b. Words take meaning in a specific context (self-perception), the teacher needs to clarify the exact meaning at a particular time. To specify and clarify the teacher needs to: i). Use teaching aids rather than revert to the child's home language; ii). Use the child's home language to clarify the exact meaning if necessary; iii). In standard 3 onwards, the home language may be used sparingly but in ever decreasing amounts;
 - c. The word 'man' is seen as gender, therefore when it is used loosely such as in 'man is destroying his environment', a child interprets this literally and concludes that only males damage the environment, and females do not. The group agreed that this and other similar misconceptions could be happening to a significant extent.
 - d. Language bridging helps to decrease language problems, but it should be supported by teaching aids;
 - e. Language lessons should be conducted in the relevant language being taught, whilst with technical subjects it is acceptable to revert to home language to explain a difficult concept.
-

The teachers also indicated that many teachers themselves had problems of accommodating some aspects of indigenous knowledge with western approaches and at times were unable to provide sufficient clarity on a topic, and thus may leave children confused. The lack of integration of indigenous knowledge into the western school system was interpreted by the researcher to be a factor that could cause tension within some children. The emphasis on language related problems in primary schools, and the perceived impact that this could have on the understanding of concepts across cultures, also indicated to the researcher that this should be an issue that should be given prominence in the training of teachers who use a second language whilst teaching. The depth of discussion indicated that members of this group had interacted with various language bridging

programmes, and understood many of the difficulties that primary school children experienced with second-language teaching. The comments and interpretations by them of children's construction of meaning was therefore seen to be more reasonable than the previous group from Workshop Two.

5.3.7 Evaluation of Workshop Three

5.3.7.1 Teacher's evaluation of the workshop

The participants were asked what should happen with the research process once the workshop had ended. Amongst a number of recommendations a major point was that the action research approach was valuable and that they would like to be involved in future initiatives, even to the extent of doing similar small scale projects at their own schools. They also suggested that this research should include more research with children themselves as a means of getting more accurate information.

5.3.7.2 Researcher's own critical reflections

Due to the more refined choice of participants, the group dynamics of this group (See Appendix D) were seen to be much more balanced than the previous group, with no dominating individuals, resulting in a freer exchange of information. The participants were also more critical in their analysis of the issues raised, providing the researcher with more reliable data than the previous groups, linking their views to educational psychology. Examples of this were their comments about 'words taking meaning within a specific context' which would tend to conform to a constructivist approach to education (Refer Section 4.4.2).

Although the participants of this group appeared to have better insight into the mental processes of BaTswana children, their views of children's perceptions of the environment conflicted with those of the group in Workshop Two, thereby not only reducing reliability and internal validity but also affecting external validity (Cohen & Manion 1989:200).

5.3.7.3 Review by Supervisor

After a discussion with one of the Supervisors, outlining the different perspectives that had arisen from Workshop Two and Workshop Three, showed that a fourth workshop should be held which would attempt to obtain clarity on the conflicting views and improve both reliability and validity.

5.3.8 Summary of issues raised in workshop

This group of teachers showed a distinct bias towards natural elements as compared to man-related elements when providing an overview of their perception of the environment (Refer Table 5.13). This may be due to the fact that this group of teachers was more involved with teaching environmental subjects at school.

The teachers' view of children's perceptions of the environment was that most children would have varying worldviews according to their needs and interests or immediate surroundings at a particular time (Refer Table 5.14). Although culture as a direct issue was not discussed in depth during this workshop, the group did indicate that indigenous knowledge was not adequately integrated with the western based school system, and the researcher inferred that this might be problematic to school children, possibly creating a degree of tension within them.

Language was not seen to be a problem to the same extent as the teachers in Workshop Two indicated, because teachers were usually known to explain difficult words and concepts adequately in both the second language and mother tongue. The teachers also felt that children in standards 3 and 4 did not give great cultural significance to concepts or words.

An interesting point was made by this group, who claimed that children would not have a perceptual bias to natural or man-related items according to a rural or urban background. They felt that the environmental perception would be more related to the immediate surroundings of a child in any given context.

5.4 SUPPLEMENTARY RESEARCH

5.4.1 Independent research on children by a participant

Supplementary research based on an explanation of each person's views of the concept 'environment' developed in Workshops One to Three was carried out directly on children in their school situations by Maremane who was a Regional Environmental Education Officer with the B.N.P.B., and who had participated in the three previous workshops. This research resulted from the action research process used in the three workshops, showing how participants can grow in confidence and ability through their involvement. The data extracted from the essays completed by the school children was integrated into the research process to improve the external validity of the results obtained.

Children from different backgrounds, and standards in schools surrounding the Pilanesberg National Park participated in the project by each completing an essay which required them to state the items which conformed to their interpretation of the concept of environment or *tikologo*.

Table 5.17: Breakdown of number of pupils evaluated per school standard and background (Independent research)

Standard	Urban	Rural
1	5	0
2	5	3
3	5	4
4	<u>0</u>	<u>4</u>
Total	<u>15</u>	<u>11</u>

The researcher recognises that the sample in each was limited and of little statistical significance, but the information obtained may be useful as an indicator and pointer to further research.

These children's scripts were evaluated in the same manner as those of all the other groups (Refer Sections 3.4; 5.1.5; 5.2.5; 5.3.4) using content analysis. Those scripts completed in SeTswana were translated into English by two different and independent SeTswana speaking staff members

of the National Parks Board, according to guidelines on categories of items given by the researcher.

Table 5.18: Comparison of number of natural to man-related categories mentioned by groups of children, per Standard (Note: R = Rural, U = Urban)

Standard	Sample Number	Number of categories Natural (X)	Number of categories Man-related (Y)	Role Model
1 U	5	13	7	4
2 U	5	6	16	4
2 R	3	2	18	3
3 U	5	2	33	4
3 R	4	4	14	5
4 R	4	15	31	7

Comment on responses:

a) Standard 1: Urban, SeTswana reply, N=5

A predominance of natural elements such as wild animals, elephant, baboon etc. mentioned (13 categories); a number of home related items such as washing-lines, clothes, cleaning the house etc. (7 categories); and a number of role model people such as police, mother etc (4 categories).

This appeared to correspond to much of the literature on child development which shows that this age group's thought patterns, and perceptions would tend to focus on the home, and imaginative natural elements that possibly exist from story telling.

b) Standard 2: Urban, SeTswana reply, N=5

A predominance of man-related items listed such as homes, shops, houses, schools, hospitals and domestic animals (16 categories); a small number of natural elements - all mentioned the adjacent game reserve, and trees and plants (6 categories); a few role model characters were named (4 categories).

These replies could portray an increasing freedom of children from home constraints and the consequent broadening of perceptions beyond the home - relating to those items most frequently

encountered. These broad perceptions could possibly be linked to the amount of stimulation provided in the context of an urban environment.

c) Standard 2: Rural, SeTswana reply, N= 3

A significant number of man-related items such as school, gardens, water-pumps, school furniture etc. (18 categories); very few natural items - only trees and water (2 categories); and a few role model characters (3 categories).

These results were surprising in that one would have expected a greater frequency of natural items to be mentioned within the rural context. This possibly relates to the children's developmental stage, where they have not broadened their field of interest beyond the home and school context as with the urban standard 2 group due to a less stimulating context.

d) Standard 3: Urban, English reply, N=5

This group's replies centred entirely on man-related items to the exclusion of natural items. The main items mentioned were hotels, schools, shops/offices, clinics and the adjacent airport (33 categories altogether); a few role model characters such as police, lawyers, magistrates etc (4 categories); the only naturally related items mentioned were people and the adjacent game park (2 categories).

This group showed a much wider range of items, possibly indicating that they had reached a developmental stage of increased independence, or that the teacher had taken the class on visits around the town as a class activity. The urban focus could be expected.

e) Standard 3: Rural, SeTswana reply, N=4

This group also showed a majority of man-related items much of which related to the school and village (14 categories); a few role model characters ie. Chief, Church Minister etc. (5 categories); and a few natural items, of which trees had a high frequency (4 categories).

Again the results possibly show that the child at this stage of development is still largely 'tied' to his known and secure neighbourhood, although the results indicate a degree of interaction with natural elements. The mention of trees however might not refer to trees in the veld, but could be the trees in the child's home-yard that he or she might play in.

f) Standard 4: Rural, English reply, N=4

This group showed a more holistic view of their environment, although man-related items were still the greater proportion of items mentioned. The man-related class included a wider spectrum of items (31 categories); a wider range of role model characters ie. singers, sports players. (7 categories); and a wider range of natural items of which trees and animals were significant (15 categories); it was also significant that 3 of the 4 respondents saw the environment as the 'place all around them'.

The responses would tend to indicate that a Standard 4 child from a rural area would be more inclined to include natural items in his concept of the environment than his counterpart in an urban area, *though the absence of a Standard 4 Urban class to compare it with negates this comparison.* The results do however indicate a broadening of the child's perceptions at this stage of development.

The researcher's analysis of the children's scripts and answers revealed much information that could be used in creating a better understanding of how children from a developing society view the environment, and how this could be used to improve environmental education learning experiences for school children. The types of items mentioned by some children, and the manner in which attitudes, values and relationships are demonstrated or symbolised could be important to teachers (Refer Appendix E).

5.5 WORKSHOP FOUR

A fourth workshop was held to clarify conflicting views about the effects of culture and language on the perceptions of children as expressed by the groups in Workshop Two and Three (See Sections 5.2.3.4 and 5.3.3.4).

5.5.1 Modifications to the action research process

The approach taken to the research in Workshop Four corresponded to that of Workshops Two and Three, which was that of 'practical action research' (Grundy 1987).

5.5.2 Profile of participants - Workshop Four

The group of nine participants was a general group of teachers invited through the Circuit Office, and consisted primarily of standard 3 and 4 teachers.

The composition of this workshop was not as carefully constituted as that of Workshop Three, due to time constraints. The invitations, sent out by the local Circuit Office, specified that only teachers involved in environmentally related subjects should attend. The profile of the group was as shown in Table 5.19.

Table 5.19: Profile of participant teachers : Workshop Four.

Age group	No. of teachers	No. heads of schools/dept.
20-29	-	-
30-39	1	1
40-49	-	2
50-59	-	4
60-69	-	1

Standard	Number of teachers
1	-
2	1
3	2
4	5
9	1

Examination of this profile shows that once again a majority of elderly teachers attended, with backgrounds in the Bantu system of education, and with possible stereotyped views of education. A significant point about this group was that eight of the nine participants were headmasters of primary schools, effectively eliminating the 'dominance effect' seen between groups with a more even spread of teachers and headmasters (Refer Sections 5.1.6.2; 5.2.7.2; 5.3.7.2).

Three GFEE Centre teachers also attended, as well as the National Parks Board, Regional environmental education Officer.

5.5.3 The action research process - Workshop Four

The workshop began with a brief overview of environmental education and related programme problems at the GFEE Centre. The action research process was also explained to prevent any apprehension of being involved in unfamiliar processes. The group appeared to be less concerned about being involved in research than the participants from Workshops Two and Three, but still displayed an initial reticence in the discussions.

The warm-up discussion focused on how the problems at the GFEE Centre could be solved. A number of practical suggestions were made on teaching practice which are commented on in Chapter Six. Two important issues raised were those of making learning situations relevant, and also understanding children's perceptions - especially with regard to wild animals. Their recommendations showed up the teacher-centredness of their thinking, by equating class visits to the GFEE Centre to the fulfilment of syllabus requirements.

5.5.4 Teachers' own perceptions of the environment

The teachers were requested to write down their perceptions of the concept 'environment' and 'conservation' as a control measure in the later analysis stage. These details are listed in Table 5.20. The results of the teacher's own perceptions again showed that they would be more likely to mention natural items (70%) than man-related or unnatural items (30%) in their description of the environment.

The researcher found these results to be equally interesting to those of similar responses received in Workshops Two and Three (Refer Sections 5.2.5; 5.3.4). The consistent inclination of teachers from these workshops to quote natural items in preference to man-related items may indicate that they have developed strong positive attitudes towards the environment as a result of exposure to environmental education messages through the B.N.P.B. environmental education programmes, or through the high level of environmental content in the media. This positive adoption of environmental values could have caused them to develop perspectives on the environment that favour nature.

Table 5.20: Frequency of mention: natural & man-related elements in concept of 'environment'. (Teachers' own perceptions)(N=9) Workshop Four

Man-related elements		Natural elements	
	Number		Number
Cultural items	10	Wild Animals	19
Buildings	5	Natural things	19
Roads	5	Trees	16
Farming items	5	People	13
Dams	4	Plants/bushes	9
Pollution/litter	4	Grass	6
Work area	3	Dongas/erosion	6
Town/village	2	Water/river	6
School	2	Soil	5
Food	2	Wild birds	4
-	-	Flowers	3
-	-	Land	2
Food	<u>5</u>	Misc.	<u>4</u>
Total	<u>47</u>		<u>112</u>

5.5.5 Teachers' views on children's perceptions

When asked to comment on the way that children perceive the environment, the participants responded individually in an open forum. Their comments tended to agree with the findings of those from the group in Workshop Three, referring to the probability that children would mention things in their immediate neighbourhood or surroundings when describing the environment. Their views are summarised in Table 5.21.

At this point in the study, the researcher began to agree with the teachers' feelings about children's tendencies to quote items immediate to their context, having read a number of the actual scripts written by the pupils in Maremane's investigation (Refer Section 5.4) where the items quoted by standard four children were still strongly tied to the home and village context (Refer Appendix E). The researcher noted the beginnings of a wider framework developing in many of the answers.

Table 5.21: Teachers' views of how Standard 3 & 4 BaTswana children perceive the environment (Workshop Four) (Summary)

- a) BaTswana children see their immediate surroundings as their environment. Things such as school playgrounds, gardens, trees, toilets, buildings, the whole village;
 - b) The concept depends on the child's age and experience, and what they have learnt in the programme. Geography will have taught them the wider concepts. Items quoted would include, houses, shops, Post Offices, shopping complexes, roads, rivers, mountains etc.
 - c) Children will definitely give different items according to their rural or urban background because of the facilities and infrastructures that they interact with;
 - d) The items quoted by a urban child will be man-related, whilst those of a rural child will be predominantly natural;
 - e) Language plays a role in how a child interprets a situation;
 - f) These differences may be created by the teacher, or could be the logical progressive development of the child.
-

Although children's background situations were noted to be influential in creating environmental perceptions, the influence of urban or rural backgrounds was noted to be a significant factor in determining the items quoted. This observation was vigorously highlighted by one elderly teacher who claimed this was based on 30 years of professional experience, and was not just supposition! The question of differing cultural perceptions in young children was debated by the group, with the following conclusions in Table 5.22.

This group tended to support the opinions of the previous group in Workshop Three on this issue, indicating that there is little substance in the view that children in primary school consciously choose between cultures when constructing their environmental worldviews. The group felt that the terms 'environment' and '*tikologo*' would be viewed as similar concepts because teachers would explain the meaning of the term or that children would ask and get clarification about them. Language therefore was not seen to be a problematic issue in forming or determining environmental concepts. This was considered by the researcher to be a rather simple answer to

the issue, in that second language learning and teaching is a topic of great concern in education, seen to be deserving of special attention in many tertiary institutions and attracting attention from researchers (Macdonald 1990b; van Rooyen 1990).

Table 5.22: Answers to question ‘Do BaTswana children perceive the concept of the English term ‘environment’ any differently to that of the term ‘tikologo’ in SeTswana? (Workshop Four)

-
- a. The terms ‘environment’ and ‘tikologo’ are seen to be the same by children;
 - b. The postulation that children attach different meanings to the two concepts of ‘environment’ and ‘tikologo’ is not valid;
 - c. Visual aids are used to portray the same meaning;
 - d. English is not seen as superior to SeTswana.
-

Responses to the topic of ‘traditional non-formal education’ playing a part in the learning processes of children in Bophuthatswana schools indicated that the western approach to education at school conflicted with indigenous education processes at home. The issue is summarised in Table 5.23.

Table 5.23: Answers to question ‘Does indigenous knowledge place a different connotation on the meaning of concepts?’ (Workshop Four)

-
- a. The differences between traditional educational methods in the home situation and western educational approaches at school are causing confusion within children.
 - b. Children hide this confusion due to fear of exposure - at school children would rather conform to the teacher’s norms than the parent’s, but would then be inclined to accept parental norms over what the teacher had taught when at home ie. hunting is accepted as a traditional activity whilst school is teaching that hunting is bad.
 - c. In general children would be more inclined to accept the teacher’s interpretation of situations, than their parents’.
-

The information obtained from this group is seen to be valuable in that it corroborates many of the issues raised in other workshops (Refer Sections 5.1.3; 5.2.6), and thereby provides a degree of validity and reliability to the action research data gathering component.

5.5.6 Teachers' suggestions to improve the GFEE Centre programme

As with previous workshops, this group was asked to reflect on the perceived educational problems considered to exist at the GFEE Centre, and to make suggestions for improvement. The following points were raised:

- the element of fun inherent in visits should be capitalised upon;
- a more 'values orientated' approach should be used;
- the natural setting of animals (cf. zoos) should be highlighted;
- children should be involved in mini-research projects;
- learning experiences should relate more to the school syllabus;
- there should be a definite educational intent in the programme (ie. not just fun);
- a balance of theoretical and practical should be aimed for.
- school teachers should be shown the benefits of visits to the GFEE Centre;
- more live animal demonstrations should be used;
- school teachers need to be supported in practical ways (ie. resources);
- more emphasis to be placed on affective domain.

5.5.7 Evaluation of Workshop Four

5.5.7.1 Teacher's evaluation

This group found that the workshop process had been valuable, and had improved their understanding of environmental issues and the manner in which their pupils viewed such things. The participants appeared neutral about undertaking personal action research projects.

5.5.7.2 Researcher's personal reflections

The researcher felt that although this group was predominantly composed of elderly headmasters, they had generally supported the findings from Workshops Two and Three on teacher's views of how children perceived the environment. The action research process had been carried out more effectively, thus allowing in-depth discussion on issues relevant to establishing a perspective on BaTswana children's worldviews relating to the environment.

5.5.7.3 Review by supervisors and peers.

No immediate feedback was obtained from the researcher's Supervisors on this workshop. Comment from him on this section was integrated in the final writing up of the thesis.

5.5.8 Summary of issues raised in workshop

This group's views on issues of environmental perception, cultural influence and language, generally tended to support those of Workshop Three (Section 5.3.8). Their personal views of the environment tended to show a tendency to quote more natural elements than man-related elements in their descriptions.

The group's views on children's perceptions of the environment also believed them to be 'contextual', in that they would see their immediate surroundings as their environment, and that it would depend on the children's age, experience and education. The influence of a rural or urban context was also supported as indicated in Workshop Two (Refer Section 5.2.8).

The possibility that standard 3 and 4 BaTswana children would view certain concepts (ie. environment and *tikologo*) from different cultural perspectives was discounted by the group, supporting the views of the teachers in Workshop Three (Refer Sections 5.3.6). Language was not seen to be an unduly problematic issue for children in understanding concepts, due to adequate explanation from teachers.

5.6 CONCLUSION

A number of issues related to the aims of the study emerged from the research process. insight was obtained from the teachers on the *perceived* environmental issues that related to the worldview of standard 3 and 4 children in Bophuthatswana. Teachers in most of the workshops (Refer Sections 5.2.6; 5.3.6 & 5.5.5) felt that BaTswana children would tend to construct environmental worldviews according to the immediate surroundings that they might find themselves in. The possibility of background and experience playing a factor in constructing environmental worldviews was not generally agreed to.

Six areas were identified by the researcher during the four workshops and Maremane's study that provided information that may be used in developing appropriate teaching approaches at the GFEE Centre. Actual programmes were not developed due to time constraints within the workshops. The six categories are: i) Children's own indication of perceptions of the environment; ii) Teachers' views on children's perceptions of the environment; iii) Teachers' own perceptions of the environment; iv) Background and experience defining perception of environment; v) Language processes in the forming of concepts and creating understanding; and vi) Tension in pupils due to home versus school circumstances. These issues are discussed in the following chapter.

CHAPTER SIX

DISCUSSION AND CONCLUSIONS

Ask the child about his family's ancestral background, the Chief in his area, how many eggs a hawk lays, local names of certain animals and insects, a simple question whose answer you would expect to derive automatically from the community and you will be disgusted to find out that the children do not know the answers. Who is to blame?

Phidian Mazarire 1988:31

6.0 INTRODUCTION

The four action research based workshops with school teachers from the Mankwe District of Bophuthatswana provided valuable data about the environmental worldviews of standard 3 and 4 BaTswana children (Refer Sections 2.1.4). The research approach was not completed without problems however, and the strengths and weaknesses of the study are outlined prior to discussion of any results or conclusions.

6.1 EVALUATION OF METHODOLOGY

The action research approach within a case study was seen by the researcher to be an effective research approach in achieving the aims of the study and in stimulating the participants to become involved in a process of educational change. Additional comment on the methodology may be found in Chapter 3.

Despite the number of weaknesses identified with the study, the researcher has identified that there were a number of strengths in the methodology and approach that possibly provided greater validity to the data collected than more quantitative studies might have achieved. These will be discussed in the following sections.

6.1.1 Methodology of the research

The researcher's lack of experience with the practical aspects of the action research process consumed valuable time in becoming familiar with the process, limiting the amount of data

collected. Although this period of orientation could be likened to a conventional pilot study in empirical research, the researcher found this approach to be less well defined and systematic. The open-ended and more loosely structured framework of the approach caused the researcher to be unclear on some aspects of data collection and generation. It therefore required him to adapt some of his workshop approaches to be able to obtain valid data (Refer Sections 5.1.6.2; 5.2.7.2; 5.3.7.2).

One of the key weaknesses of the study was noted by the researcher to be the limitations that developed in the implementation of the action research process. Due to unfamiliarity with the approach, the researcher did not identify some possible research processes that might have added to the validity and reliability of the process. For example, extending the action research process by using teachers to gather data with their children in a school-based situation could have provided greater insight which may have complimented the results of this study. A further avenue which was not pursued was to get the teachers to undertake mini research projects in which they could have formed groups at school to workshop issues relating to the research topic.

The inherent flexibility of the action research approach may also be seen to be a major strength which significantly enhances the internal validity of the study. The manner in which the researcher was able to modify each workshop to focus upon certain issues to obtain more relevant information was seen by the researcher as an important factor in the success of the study. The action research process allowed specific issues to be investigated in detail, providing information that might not usually be possible in more structured approaches to research.

The researcher felt that the participatory nature of the action research approach encouraged all the teachers to become involved in the discussions, removing the formal atmosphere of 'research', minimising suspicion of research processes and thereby, in the view of the researcher, allowing them to be more honest and open in their contributions. The groups' discussions stimulated the teachers to think more widely or holistically about the issues that related to the research goals (Refer Section 1.2) than they might have if answering a written questionnaire, or structured interview. The high level of involvement of many of the

teachers in the study process is seen by the researcher to have increased the validity of the results concerning discussion of children's perceptions of the environment, though this may have been further improved with alternative sampling procedures that minimised the dominating effects of principals in some workshops (Refer Sections 5.1.6.2; 5.2.8.3; 5.3.7.2 & 5.5.7.2).

A further strength of the research approach was that of relevance. The aims and methodology of the study allowed the researcher to concentrate upon the problems which were perceived by him, GFEE Centre teachers and school teachers, as important and relevant to the programme offered at the GFEE Centre. This emphasis on analysing 'real, classroom-based' problems allowed participants to provide meaningful information about BaTswana school children's worldviews relating to the environment, and to suggest improvements to the GFEE Centre programme - minimising theoretical conjecture and suggesting instant solutions to the problems. The researcher feels that this element of relevance added to the face validity of the study (Refer Section 3.6).

The chance to obtain deeper insight into issues raised in workshops was possibly lost due to a lack of follow-up with participants after they had time to reflect upon the proceeds of their discussions. Follow up with groups could have enabled the researcher to introduce an element of 'emancipatory action research' into the study, which would have enriched the process by stimulating educational change and initiating an "improvement in practice" which is one of the principle aims of action research (Cohen & Manion 1989:224). Additional workshops may have added to the reliability of the study. Time constraints however prevented the researcher from extending the study to incorporate adequate follow-up. Should the research be repeated, this aspect should be clearly built into the process from the beginning as a fundamental element of the approach.

The researcher has realised that a more rigorous investigation of research methodology would have allowed additional methods of analysis to be incorporated into the study. These other methods would possibly have provided greater insights into the issues raised by the teachers in the workshops. The absence of any method to gather data on the 'affective domain' component of children's worldviews has limited this study's ability to provide a

comprehensive comment on children's perceptions of the environment. The use of the "semantic analysis" approach (Sanders & Pinhey 1983:193) within the field of content analysis, where the weighting of weak-strong dimensions of emphasis are measured, may have enabled the researcher to analyse essays written by the teachers in a manner which would have provided a perspective on children's feelings and emotions towards the environment. Such analysis might have given an insight into the affective components of children's worldviews.

The data collected may be viewed by some readers as being of a tenuous nature due to the fact that it was obtained from a 'second-party', and not directly from BaTswana school children (Refer Section 5.1.6.1). It should be noted that the researcher was aware of this weakness from the start (Refer Section 3.1.2) but the level of research expected in this study by the examining body precluded direct interaction with children. The researcher feels that this weakness reduces the face validity of the research (Refer Section 3.6).

6.1.2 Conducting the research

A number of issues relating to how the research was conducted became evident as the research progressed, and these were: a lack of focus, personal bias in areas of interest, directing the action research process, and lack of true engagement with participating teachers.

A lack of initial focus regarding issues and areas of investigation with this type of approach was found to be frustrating due its democratic nature (Refer Section 3.1.2). Although the research topic had been thoroughly investigated, the issues raised by the participants widened the scope of research which resulted in the researcher having to spend time on them to evaluate if they were relevant to the focus of study. The investigation of possible differences in meaning between the terms '*tikologo*' and environment is a case in point (Refer Sections 5.2.6; 5.3.6; 5.5.5). A number of relevant and helpful points were identified though through this process, as evidenced by the point that emerged which showed the need to get teachers and principals to have a better understanding of environmental issues.

The action research process, being a participatory approach to research, allows a researcher to be both observer and participant at the same time. It is therefore easy for the researcher to influence the process though this was guarded against (Refer Section 5.1.6.2 & 5.3.1). In retrospect the researcher found that, despite every effort to be impartial, elements of bias were introduced by him which focused the groups' attentions on the concept of perception to the exclusion of other issues such as values or attitudes (Refer Section 2.1). The consequence of this is seen to be that the role of values and attitudes in children's worldviews of the environment was not adequately researched within the workshops.

The particular circumstances of the research required the researcher to manipulate certain elements of the research process, and this may be seen as a major weakness by some proponents of action research (See Sections 5.2.1 and 5.3.1). Although O'Donoghue (1990:95) claims that such an action research approach could be termed "pseudo-participatory" it is accepted practice under certain conditions and constraints in what Grundy (1987:149) calls "practical action research". Such guidance may at times become a strength in that certain important issues may be investigated in-depth. The degree of participation achieved in the workshops was considered by the researcher to have been more meaningful than many forms of survey or questionnaire based research, because the teachers had the ability to concentrate on issues felt to be relevant and important in the context of the study.

The researcher feels that the one-day workshops conducted in this study were too brief to develop close relationships with the school teachers, thereby preventing issues from being explored in greater depth. Action research projects that permit deeper involvement between the researcher and participants, through a number of cycles of the process, are considered by the researcher to have greater validity. Deeper involvement may also have stimulated more meaningful change within the participants. The rationale for this would be that a deeper relationship between the researcher and teachers could overcome barriers such as possible distrust, shyness or lack of confidence. The researcher found that time and distance constraints limited the possibility for more in-depth workshops from being implemented.

The transient nature of the participation of most of the GFEE Centre teachers, was seen in retrospect by the researcher, to be a serious flaw in the data gathering process. Increased

participation of these teachers would have in the researcher's view, considerably enhanced the internal validity of the study due to their in-depth involvement of teaching environmental education to standard 3 and 4 pupils on a daily basis. The lack of interest displayed by some of the GFEE Centre teachers, or the requirement of others to accompany resident school groups resulted in many of the GFEE Centre teachers only being intermittently involved in the four workshops. The apparent disinterest of some of the GFEE Centre teachers was possibly due to their lack of participation in the planning process of the study, especially seeing that it took place on their premises. This lack of ownership in the study highlights the need for researchers who use action research to ensure that adequate planning and consultation precedes the start of the process. The researcher feels that the GFEE Centre teachers were possibly the best placed group within a teaching context to have been able to develop a clear insight into how standard 3 and 4 children view their environment.

6.1.3 Achievement of study aims and goals

The aims of the research (Refer Section 1.2) required that the environmental education programme of the GFEE Centre should be orientated to the needs and context of the children in Bophuthatswana as a developing society. To achieve this the following research goals were set:

- a) To investigate practising teachers' perceptions of environmental issues relevant to the worldview of standard 3 and 4 pupils in Bophuthatswana;
- b) To use those perceptions as a basis for developing appropriate programme content and teaching approaches for the Gold Fields Centre which would conform to environmental education principles.

When considering the above goals, the researcher feels that sub-goal a) has largely been achieved, though sub-goal b) has only been partially achieved.

With regard to the first goal, considerable data were collected based on the views of the participants in the four workshops and minor studies with actual children. Based upon this data, the researcher feels that adequate insight was gained to give an **indication** that it is not feasible to describe a worldview concerning the environment that is common to all standard

3 and 4 pupils in Bophuthatswana. It should be noted though that these results are the views of the teachers involved, and as such may not be taken as absolute conclusions. This insight may therefore be used, with appropriate caution to develop relevant learning experiences for children at the GFEE Centre.

The results obtained, although valuable as an aid to the development of appropriate learning experiences at the GFEE Centre, are seen by the researcher to be limited. The skewed views of the **participating teachers' own environmental perceptions** as indicated in the control test analysed in Section 6.2.3, could cause a possible distortion in their views of children's environmental perceptions. This weakness is seen by the researcher to reduce the internal validity of the study (Refer Section 3.6). **The data provided by the teachers, and the results that relate to environmental perception, should therefore be used with caution due to the possibility that they may not be value-neutral.** The process of using a second-party to obtain such data is seen to be inferior by the researcher, precluding the generation of more in-depth and valid data through a direct source. The small number of scripts produced directly by children in Workshop One and in Maremane's investigation (Refer Sections 5.1.5; 5.4), indicated a superior method of generating data, where such direct answers may be analysed for a range of data including cognitive and affective information.

With regard to the second goal, the researcher feels that this has only been partially achieved. The difficulties in obtaining clarity on children's perceptions of the environment occupied much of the time allocated to the workshops, and even necessitated further workshops being scheduled (Refer Sections 5.1.6.3; 5.3.7.3). The researcher found that it was impractical to develop programme content of any significance within the time span remaining in the one day workshop, after children's environmental perceptions had been explored in-depth. Teaching approaches were superficially investigated, although time constraints once again precluded the development of in-depth, lesson specific approaches.

The teachers in the four workshops did, however, provide many suggestions to improve the GFEE Centre programme content and teaching approaches (Refer Sections 6.4.1). The researcher does concede that the development of appropriate content and teaching approaches

could have been incorporated in a more extensive action research process with the school teachers.

6.2 CONSOLIDATION OF RESULTS: PEDAGOGICAL ISSUES

Six categories of issues directly relating to BaTswana children's worldviews and perceptions of the environment were identified by the researcher during the four workshops and in the independent data collection exercise done by Maremane (Refer Section 5.4.1). The six categories are: i) Children's own perceptions of the environment; ii) Teachers' views on children's perceptions of the environment; iii) Teachers' own perceptions of the environment; iv) Background and experience defining perception; v) Tension in pupils due to home versus school circumstances; and vi) Language processes in the forming of concepts and creating understanding.

Table 6.1 Summary of issues raised in Workshops 1-4 (Table Numbers in brackets).

No.	ISSUES RAISED	WORKSHOPS				
		1	2	3	4	ADD
1	Children's own perceptions of the environment	Y (5.4)	-	-	-	Y (5.18)
2	Teachers' views of children's perceptions of the environment	-	Y (5.11)	Y (5.14)	Y (5.21)	-
3	Teachers' own perceptions of the environment	Y (5.1)	Y (5.9)	Y (5.13)	Y (5.20)	-
4	Background and experience defining perceptions	-	Y (5.11)	Y (5.14)	Y (5.21)	-
5	Tension in pupils due to home vs school circumstances	-	Y (5.10)	Y (5.16)	Y (5.23)	-
6	Language processes in forming concepts & creating understanding	-	Y (5.10)	Y (5.16)	Y (5.22)	-

Footnote: Y = Yes issue raised; - = issue not raised; (5.1) = Table reference number; ADD = external data gathered by Maremane.

6.2.1 Children's own perceptions of the environment

The data collected in Workshop One (Refer Sections 5.1.5) provided an indication that BaTswana children may have a relatively balanced view of the environment, whilst the data collected by Maremane (Refer Sections 5.4) indicated that BaTswana children could have a view of the environment which favours man-made elements. This data was obtained through very small sample groups, and therefore the researcher did not use it individually to formulate any conclusions about the concept of an environmental worldview (Refer Section 5.1.6.3). The data can be used however however to indicate possible insights to children's developmental issues. One factor which was indicated by analysis of the responses was that BaTswana children appear to follow accepted patterns of development as described in educational psychology literature, working out from a narrow perspective of 'home and mother' in Standard 1, widening to the 'school and village' in Standards 2 and 3, to a broader awareness of the environment, beyond the village confines in Standard 4 (Refer also Section 6.2.1). This process was also shown in the analysis of the children's answers given in Maremane's investigation (Refer Section 5.4).

6.2.2 Teachers' views on children's perceptions of the environment

The teachers' discussions during the four workshops indicated that a number of factors influence children's worldviews generally, and their perceptions of the environment specifically. The conclusions of the teachers in the Workshops Two, Three and Four (Refer Sections 5.2.5; 5.3.6; 5.5.5) would seem to indicate that Bophuthatswana children's worldviews regarding the environment may often be influenced by their immediate surroundings or situation they find themselves in at a particular time. The background and developmental age of were also considered by some of the teachers to be possible factors that could influence the development of the children's worldviews. Differences between children were seen by the teachers to emanate from individually varying experiences with the environment. **No one perception or worldview relating to the environment was identified to describe that of children in a developing society generally.** This dynamic view of children's worldviews and perceptions corresponds to O'Donoghue and Taylor's (1989:8) argument that:

Awareness and other perceptual and behavioral factors are orientated to specific situations ... It is thus difficult, if not impossible, to capture people's awareness and attitudes, which, although relatively stable, may be highly variable in differing situations, and may also be reconstructed during social interaction."

The need for teachers to be aware of each child's level of cognitive development was highlighted by the comment from one teacher, who said that concepts being taught were not related and linked to other concepts well enough, and that this could create difficulties in comprehension. He confessed that **it was only in Standard 7** that he personally suddenly realised that the map of southern Africa, usually shown as an independent unit, was actually the bottom portion of the complete map of the African Continent.

There was a strong feeling within some groups (Refer Section 6.2.4) that children's background experiences (ie. urban or rural upbringing) may influence levels of knowledge about, or the formation of attitudes towards, the environment (this is discussed in more depth in Section 6.2.4). Peled (1989:19) comments on these contextual relationships,

Our experiences of places and our intentions and actions toward them are determined by the way people construe them, by the way we perceive the entities that populate them : people, objects, hills, fields, space itself.

Inherent in this description is the idea that the people are also part of the 'stage and setting' in each situation, and therefore their presence must influence the context and meaning given to the situation. If this is indeed the case, then one may wonder what the impact of negative self-perceptions are on children's world-views, and thereby on the perceptions of their environment? In researching the relationship between teaching-learning situations and the socio-economic life-world of pupils in developing communities, Thirion (1989b:391) concluded, "The most detrimental effect of a poor socio-economic life-world on the black pupil is the negative self-perceptions pupils develop." One may therefore speculate on the influence that these self-perceptions might have on such things as a person's attitude toward littering, polluting, inappropriate land-use practices and other anti-socially orientated environmental behaviour.

Taking the above issues into account, the researcher feels that the teachers at the GFEE Centre should be able to orientate or develop environmental education learning experiences to suit the needs of standard 3 and 4 BaTswana school children. These experiences may therefore be developed to suit the development levels of children (Refer Section 4.4.2) and may include appropriate elements or relationships of the environment that would enhance improvement in knowledge, understanding, comprehension and other learning processes. The content of programmes may therefore include environmental factors and issues that relate directly to a child's contextual framework, such as availability of potable water in a rural area, and use these to develop the environmental learning experiences.

The issue of children's attitudes and values that relate to the environment was not directly covered in the workshops, though peripheral discussion in the workshops did allude to the topic (Refer also Section 6.2.3).

6.2.3 Teachers' own perceptions of the environment

This series of inquiries into teachers' own perceptions of the environment was introduced to act as a form of control for the overall study, where these results could be compared to the teachers' views on children's perceptions of the environment. Such a comparison was seen to be essential should the teachers' views of children's perceptions have been similar to those of their own personal perceptions. This was not found necessary.

The analysis of the responses from the participating teachers as their own perceptions of the concept of 'environment' (Refer Table 6.2), showed a hazy and varied understanding of it, though a small number indicated a clear grasp of the holistic nature of the term.

Table 6.2 Consolidated data on teacher's perceptions of the environment. Total mentions: Man-made/Natural items per workshop

Workshop number	Number teachers	Man-made		Natural	
		Number items	Average items	Number items	Average items
2	15	92	6,13	135	9,00
3	8	17	2,13	54	6,75
4	9	47	5,22	112	12,44

It was interesting to note that all the groups' averaged responses for natural items in Table 6.2 were consistently higher than those of man-made items. This finding was the reverse of the expectations that some teachers from Workshop One had of children's responses (Refer Section 5.1.5). It could be argued though that this discrepancy may result from the teachers having gained more knowledge about environmental issues through experience and study.

A more detailed analysis of the data gathered from the teachers in Workshops Two to Four (See Tables 5.8; 5.12 and 5.18) on their own perceptions of the environment was carried out, whereby all their responses were averaged and ranked (See Appendices F, G, H and Table 6.3). Thirteen categories of items were found to be common to the data from the three workshops. Ten of the thirteen categories were natural items. A significant finding was that six natural items: natural things/areas, wild animals, trees, people, plants/bushes and soil were found to be common to all three sets of data from the three workshops, and were all ranked in the **top ten** items quoted. No single man-made or unnatural item was found to be common to the top ten places of all three sets of data.

Only three categories of unnatural items (pollution, houses and roads), were found to be common in the **top twenty** items quoted. This result is interesting when compared to the teachers' assertions that BaTswana children would provide a balanced perspective, or one dependant on their background and development level (Refer Section 5.1.5 & 6.2.2). The teachers' perceptions of the environment which favour natural items may be the result of the vigorous environmental education programmes that the B.N.P.B. had mounted within schools from 1981 (Refer Section 1.4.1).

Table 6.3 Teachers own perceptions: Ranked averages of categories mentioned.
(Consolidated from data - Appendices F, G & H).

Category	WORKSHOPS			
	1	2	3	
	Rank	Rank	Rank	
Natural area/things	1	1	1	A
Wild animals	2	2	2	A
Tree	3	6	3	A
Soil	4	4	9	A
Plants/bushes	5	10	6	A
Houses/buildings	6	17	10	B
Pollution/litter	7	9	14	B
People	8	3	4	A
Farm items/farmyard	9	-	12	
Cultural items	10	-	5	
Erosion/dongas	11	5	8	A
Water	12	14	16	A
Wild birds	13	11	15	A
Work areas	14	-	18	
Roads	15	8	11	B
Domestic animals	16	-	-	
Gardens	17	-	-	
River	18	15	-	
Grass	19	7	7	A
Mountain	20	-	-	
Land	-	12	-	
Dump sites	-	13	-	
Flowers	-	16	17	
Dams	-	18	13	
Town Village	-	19	19	
School	-	20	20	

Note: A = Natural items common to data in Workshops 2,3 & 4.
B = Unnatural items common to data in Workshops 2,3 & 4.

The tendency to quote natural items is also interesting in that many of the teachers may have had access to Bophuthatswana's official teacher's manual for Geography (Irwin *et al.* 1986:28), in which the concept of 'environment' is defined in holistic terms (Refer Section 5.1.3).

6.2.4 Background and experience as factors that influence perception of environment

The teachers from Workshops Two and Four concluded that children from rural schools or areas would be more inclined to mention natural items in their perception of the environment, compared to urban children quoting more man-related items (Refer Sections 5.2.6; 5.5.5). The group in Workshop Four felt that urban children's exposure to media would significantly influence this tendency (Refer Section 6.2.6). This conclusion was not supported by the teachers in Workshop Three (Refer Section 5.3.6) or by the data provided directly by the children (Refer Table 5.18). This contradiction indicates that further research in this field might be worthwhile, though it should be noted that the data from the children used in Table 5.18 should be treated with caution due to small sample sizes.

The researcher considered that the implications of this single factor of urban/rural background could be important in developing or modifying an environmental education programme. Time constraints prevented further investigation of the issue, but the researcher decided to review the literature for additional insight. A synthesis of the study is provided in the following few paragraphs.

The relevance of contextual experience in education is emphasised by Hawes (1979) from his studies in East Africa, in which he found that the actual physical and social environment that children interact with has a profound effect upon the way in which they develop their perceptions. Hawes (1979:13) contended, with a caution about generalising:

A child in a materially and culturally rich area has a causal and continuous fund of experiences, in the market, at festivals, in the lorry park, by the roadside. A child in the deep rural community preoccupied with seeking survival has far fewer. Wide variations predictably exist not only in what children know but in their perceptual and cognitive development."

These findings are supported by Eisemon (1989:344) in his studies of education in African countries.

The placement of a school in a natural or man-made environment is also seen by Hawes (1979) to have an influence on the pupil. He explains that rural children are at a disadvantage due to the "lack of straight lines, angles, or congruent objects. Moreover country children often discover their syllabuses, materials, examinations, all tend to be framed by and for people from more prosperous environments". The existence or absence of such stimuli could also influence children's development of environmentally related perceptions and worldviews. Giving a developing society perspective Mwamwenda (1989:97), claims that "Urbanisation is not an African concept as it is a western concept. Therefore, what occurs in an urban area partly reflects western culture, particularly with regard to technology."

Hounshell and Ligett's (Cited in Iozzi 1989) studies into school children's knowledge of, and attitudes towards the environment, found that urban students were more knowledgeable than rural students about the environment but that environmental attitudes of both groups were not significantly different. However, Leftridge (Cited in Iozzi 1989:7) found that "regardless of the geographic setting, environmental issue, or amount of education, rural students were more receptive about environmental issues than urban students." These findings provide much food for thought with regard to how environmental education programmes might be better constructed in the light of such information, enhancing the urban component of programmes for rural children and more nature based programmes for urban children.

Using the above information, teachers at the GFEE Centre would be able to specifically develop learning experiences that could capitalise on a child's background and supplement potential areas of weakness. An example of this would be that rural children could be provided with learning experiences that integrate more natural elements found in rural areas whilst still being exposed to critical issues that relate to an urban situation.

6.2.5 Tension in pupils due to home versus school circumstances

The socio-cultural aspects of education in a developing society, and their impact on the worldviews of children was raised and debated vigorously in every workshop. The implications of this, regarding the question of how children perceive the environment, became an important issue for investigation by the researcher. Teachers in the Workshops One, Two and Four felt that cross-cultural influences are causing confusion and tension in children, (Refer Sections 5.1.3; 5.2.6; 5.5.5) with the teachers in Workshops Two and Four expressing this concern very clearly (Refer Table 5.23). The strongest argument though came from participants in Workshop Two who made the following statements:

The term conservation is seen to be a confusing or frustrating one to BaTswana children, due to the conflict they have between indigenous knowledge of the home situation, and lessons given at home ie. indigenous knowledge tells the tribe to burn the grass to kill ticks, whilst school tells the child not to burn the grass because it causes soil erosion; and local knowledge requires trees to be cut for fuel and building material, whilst school lessons preach that trees must not be cut down. The group felt that the content of the message was at fault; and...

The very different context of a child's home and school environment can be a major problem. Our children experience a degree of culture-shock daily, when moving from home to the school system and back again in the afternoon. The degree of shock is more marked in less-developed communities such as in Swaziland. A reduced exposure to deep cultural tradition nowadays does not make school that different from home. The western lifestyle is not very foreign to us in Bophuthatswana nowadays."

The researcher feels that the implications of such tension, if experienced to extreme degrees such as in deeply traditional contexts, could be limiting the development of some children. The extent of rationalisation needed by such children to achieve a balance between the old and the new may be too great to accept easily or readily. In Piaget's (Schiarnberg & Smith 1982) terms, this might equate to the absence of an *equilibrium* through the lack of 'accommodation' of old actions to new situations and the lack of 'assimilation' or application of existing behaviours to new contexts. As such a dysfunctional learning environment may be created, with the pupils using forms of displacement behaviour such as rebellious actions, truancy and agitation, to cope with the school situation.

It is the researcher's personal experience that there is a particular resistance by school pupils to the study of scientific and mathematical subjects within developing societies. This trend may well be linked, amongst other factors, to unacceptable levels of tension created by the major differences between indigenous knowledge processes (Refer Section 4.4.3) and western approaches of modern science. Another point made during Workshop Four was that learning and education are currently seen in developing societies to be separated from community processes, whereas education was integrated into such processes and was a communal responsibility. Hewson (1988) supported such views with his opinion that the differences between the western framework of modern science and the everyday framework of non-western students are likely to cause confusion.

The debate within Workshop Two on the topic of differing perceptions of the concepts 'environment' and '*tikologo*' based on socio-cultural arguments was refuted by the groups in the subsequent two workshops. The linguistic implications of such issues (Refer Section 6.2.6), was also considered, though the cultural debate was pursued with some vigour. The intensity with which Workshop Two's group supported the claim, is evidenced by the conclusion that the teachers came to:

Terms used in English, or defined in English, are seen to "belong to the whites" - "*tša makgoa*". Children do not perceive an automatic association between '*tikologo*' and 'environment' - the concept of 'environment' is seen as something special or different and therefore is not the same as '*tikologo*'. When the English term 'environment' is used, it is seen as something worth listening to, and pupils therefore listen with "different ears" and look for different meaning, and all the following information about the environment is also seen with a different meaning. Therefore the term may be associated only with National Parks.

The last sentence may be of great significance to the way in which environmental education is used to create more balanced views amongst children. One of the GFEE Centre teachers commented during Workshop Two that children tend to understand environmental processes in their home context, but become confused with the theoretical and abstract concepts at school. It was also his view that the children that visit the GFEE Centre tend to see the 'environment' as only occurring in the Pilanesberg National Park. This issue should not therefore be summarily dismissed as problems of interpretation may exist in schools, and the topic probably deserves more in-depth study.

A degree of 'tension' or internal conflict is considered by McNaught (Pers. comms. 1990) to be important in learning processes and in the development of curriculums. McNaught sees that people in their struggle for survival in life, over periods of time observe, analyse, reflect and adapt to information and stimuli received. This process creates an inner tension that influences the need for change. At the same time social experiences also influence people and the need for change, which challenge their fundamental structure of meanings that they have created through existing knowledge and understanding. This in turn influences people's worldviews, attitudes, behaviour, values and knowledge or 'personal, mental, contextual framework.' Therefore the element of tension that is seen to exist within BaTswana schoolchildren may be beneficial in stimulating the children to observe, analyse, reflect upon the two differing 'truths', and adapt their knowledge, attitudes, values, behaviour and worldviews accordingly. It is interesting to note though that the group in Workshop Four felt that when pupils experiences such high levels of inner conflict, they are most likely to resolve this by accepting the teacher's explanation on such issues above that of their elders in the home situation (Refer Table 5.2.3). Should extremely high levels of internal conflict exist, however, they could have negative implications for the teaching of environmental education in a developing society context. Further research into this particular field needs to be undertaken.

The levels of conflict created between traditional and western education processes may be to some degree attributed to inadequate teaching or explanation. The roots of this argument may be found in the comment given by the group in Workshop One: "Some negative 'feelings' towards the environment might exist in people nowadays, because of the failure (by authorities) to explain why things should not be done" (Refer Table 5.2). This problem was also raised by the group in Workshop Three (Refer Sections 5.3.5; 5.3.6) with regard to the perception that many teachers have an inadequate understanding of the scientific connotations of concepts such as 'environment' and 'ecology'.

As with the issue of urban/rural backgrounds having an influence on learning processes, the researcher felt that the question of culturally induced tension in learning situations warranted further investigation. Again, only a review of the literature was undertaken due to time

constraints. The views and comments in the following paragraphs were extracted from the literature covered.

The role of culture in education has been studied by many researchers (Hawes 1979; Solomon 1987; Hewson 1988; Driver 1991) with the result that there appears to be two polarised fields of thought on the issue: that culture plays a minor role and that culture plays a decisive role in education.

Mays (1985:25) contends that children lack a cultural and social dimension to their thinking. This view has subtle and far reaching implications: - "A general way of putting it would be to say that everything we perceive is influenced by the perception of other people." Similar views are expressed by Driver (1991:48) who sees that common physical stimuli impact on children across cultures and create similar scientific conceptual 'models' in most children's minds. This culture-neutral view of children's perception, cognition and understanding is in contrast to that of the developmental psychologists Liddell *et al.* (1991) who claim that culture is important in the developmental process, especially where children are not exposed to contact with children from other cultures. Hewson's (1988:321) studies with students in Qwa Qwa and Soweto in South Africa, indicated that there can be "persistent alternative conceptions" to orthodox scientific views, which would seem to indicate some element of cultural origin to perception.

The socio-cultural experiences of Black pupils are seen by Lindeque (1987) to have an influence on their cognitive states as the emphasis on tradition at home is in conflict with the western orientated syllabuses at school. This is supported by Macdonald (1980) in a study of black pupils in Ciskei, and also by Thirion (1989b).

In an international context, education itself is considered by Solomon (1987) to be culturally specific. She quotes Wertsh *et. al's* (1984) comparison between education through school and education by parents in Brazil, which drew attention to how deeply embedded in context most socio-cultural learning is. These findings from Brazil, which is also a developing society, have significance for this study. The socio-cultural implications inferred here may be significant when examining the context in which learning takes place within the developing

society of Bophuthatswana. Macdonald (1990a:12) also emphasised the concept of embeddedness as follows: "The black child within the framework of 'blacks' in South Africa may belong to a (constructed) reality which differs from the reality in which formal western schooling is embedded."

An important factor raised by the group in Workshop Three was the fact that as many as 50% of children stay with their grandparents whilst attending school. This should be seen as an important factor in a child's schooling performance, cognitive development and affective growth, if elderly grandparents are unable to provide as stimulating a home environment as younger parents might be able to.

6.2.6 Language as a factor in forming concepts and creating understanding

The role of language in teaching, learning and formation of perceptions is a broad and complicated field and will not be expanded upon in this study, except to show that this important link in the learning process was seen to be significant in children's development of perceptions about the environment. It was one of the most consistently raised issues with all the groups. This may be characterised by the view of the group in Workshop Four:

Language plays an important part in the child's interpretation of the concept. Urban children are more exposed to the media which influences their thinking, enables them to learn more and gives them a broader exposure to environmental issues. Rural children are restricted in their exposure, and will have a narrower perception of issues.

The groups generally found that a problem of language and interpretation *does* exist for young children. In their own home situation children do not appear to have problems understanding environmental processes, the problem could therefore exist at school where concepts are portrayed abstractly. The potential for complex terminology inherent in 'western' interpretations of science to create difficulties for second language users cannot be overestimated (Hewson 1988).

The different interpretations of the concepts of '*tikologo*' and 'environment' were seen to be problematic by some participants where children were thought to define 'environment' in English terms. This view point was dismissed by the majority of the participants in

Workshops Three and Four, and viewed as an isolated instance of poor teaching. The researcher upon later reflection feels, though, that the issue was not adequately investigated based on the argument that more concrete or tangible concepts such as 'plants' may be more readily explained and understood by children, whilst more "abstract and remote" concepts such as 'environment' may be less clearly understood by standard three or four children (van Rooyen 1990). The problem with constructing explanations about unfamiliar terms was also found to exist in African school pupils by Eisemon (1989). This area of study therefore possibly warrants further research.

6.3 CONSOLIDATED RESULTS: GFEE CENTRE PROGRAMME DEVELOPMENT

A summary of the data obtained from the study indicated that the educational problems that existed in the GFEE Centre had two dimensions: a) improving the GFEE Centre programme, and b) identification of general education issues in Bophuthatswana.

6.3.1 Improving the GFEE Centre programme

A number of practical suggestions were made by the teachers in the four workshops on how to improve the GFEE Centre's programme in relation to the background and context of BaTswana Primary School children. The major points recorded from the workshops were:

a) Adopting child-centred teaching approaches

The teachers in Workshops One and Three (Refer Sections 5.1.5.3 & 5.3.5) commented that teachers should understand that all children are individuals and have their own needs and desires, and they must be sensitive to these needs when creating learning experiences. Unreasonable needs (wants) must not however prejudice group needs unjustifiably.

b) Relating GFEE Centre experiences to school syllabus

Three groups (Workshops Two, Three and Four - Refer Sections 5.2.7; 5.3.5 & 5.5.6) expressed the need for the GFEE Centre programme to relate more closely with the school syllabuses where necessary. This was also seen as a motivational factor to attract teachers

to get their classes to visit the centre. It was also felt that B.N.P.B. staff should be more pro-active in explaining the benefits of visits to the GFEE Centre to school teachers.

The school teachers explained that the present situation in which the GFEE Centre teachers develop learning experiences according to the views of the B.N.P.B. staff should also be modified to a more participatory approach which incorporates the environmental education needs of school teachers. This does not mean though that the GFEE Centre programme would only become a substitute for school based ecology or geography lessons, but that through adequate training environmental education would be used as a medium through which many subjects could be taught at the centre. Essentially the environmental education function should be devolved to practising school teachers who would use the GFEE Centre and the park as a teaching resource.

c) Balance of theoretical and practical learning experiences

The need to provide a more balanced programme, which includes more practical experiences with the environment, received support from many teachers in Workshops Two, Three and Four (Refer Sections 5.2.7; 5.3.5 & 5.5.6). The general feeling was that there was too great an emphasis on classroom-based teaching and not enough outdoor based experiences.

Many disadvantaged pupils at school in Bophuthatswana are brought to the GFEE Centre to see wild animals in a natural setting. Environmental education using 'hands-on' encounters with nature, using live animals such as snakes and birds, was considered to be valuable in reinforcing school-based work. The teachers felt that this would enable children to obtain a better understanding of environmental issues.

d) Provision of support after visits to GFEE Centre

Many teachers identified the need for the B.N.P.B. to provide support to schools in the form of pre-visit planning and post-visit follow-up (Refer Sections 5.2.7; 5.3.5 & 5.5.6). This support was also seen by the teachers to extend to the development and provision of physical teaching aids and resources that were related to the syllabus.

e) Adoption of a cross-curricular approach to teaching

The groups from two workshops (Refer Sections 5.1.5.3 & 5.3.5) saw that the teachers at the GFEE Centre were limiting the potential of the programme by focusing largely on ecologically-based issues. It was suggested that a cross-curricular approach be incorporated into the programme.

f) Use of appropriate language whilst teaching

Language was considered by the teachers in Workshops Two, Three and Four (Refer Section 5.2.6 & 5.3.6 & 5.5.5) to be an important factor in ensuring that children who visit the GFEE Centre optimise their learning experiences by facilitating increased knowledge, sound understanding and improved comprehension (See also Section 6.2.6).

6.3.2 Environmental Education and school issues

The current syllabuses used in Bophuthatswana's Primary Schools are based upon western educational approaches with an emphasis on science and mathematics, alongside languages (Republic of Bophuthatswana 1978). The educational approaches in southern Africa have largely followed a 'teacher-centred' or exposition model of teaching and learning (Nasson & Samuel 1991). The teachers' discussions during workshops indicated that 'teacher-centred' western teaching approaches were also widely used within the school system of Bophuthatswana.

More appropriate child-centred teaching approaches would facilitate interaction between the teacher and child, allowing the teacher to gain a better understanding of the child's learning needs. The one group actually commented that teachers should be encouraged to reduce their dependency on the textbook and be more creative and independent. The exposure of teachers in developing societies to more appropriate teaching approaches is therefore seen to be necessary. Despite this though, the pressures of large numbers of pupils per class and the autocratic approach to education in the country, all leading to the 'survival teaching' syndrome mentioned in Section 2.6.2, may need to be addressed before new teaching approaches may be considered.

The formative role that a teacher plays within the educational and learning process was emphasised by some of the teachers. They viewed the teacher to be a key authority figure in a primary-school child's life. Although unduly inflexible and authoritarian approaches to education, such as the *command style* of teaching (Mosston as cited in Brady 1985:8), may sometimes be appropriate, the influence of such teachers as role models and figure-heads in a child's developmental processes cannot be dismissed. Such authoritarian approaches should be used where appropriate to assist children to develop holistic and responsible attitudes towards the environment.

The relationship between headmasters and teachers was highlighted in the research process, where participants indicated that authoritarian attitudes prevented innovation in schools. They also commented on the implementation of curriculums, where the authorities required certain actions to be taken without knowing the problems on the ground. Such an example was that quoted by teachers in Workshop Three, relating to some headmasters not knowing about ecology or environmental issues, and yet expecting the teachers to include them in the class work: "Do headmasters and teachers understand what the concept of conservation is, and do they have a common understanding of the concept?" The outcome of this lack of understanding was that headmasters used the 'conservation lesson' as an opportunity to get the children to pick up litter in the school grounds and save money on labourers - ultimately creating the view that conservation education was a form of punishment.

During Workshops One, Two and Three some of the teachers indicated that there might be a general lack of clarity of the *concept* of the environment throughout the teaching profession (Refer Section 5.1.5.2; 5.3.5). They also indicated that few teachers had a clear understanding of *environmental issues*. This was highlighted by the comments from the group in Workshop Two:

- a) School teachers themselves did not understand enough about 'ecology' or 'environment' and therefore could not follow up on the learning experiences once they returned to school;
- b) There is a perceived 'gap' in school teacher's understanding relating to western/Indigenous knowledge which results in them not being able to recommend or teach the correct practices;

- c) Teachers need to know the motive or reason for teaching particular concepts, subjects or topics;

Some teachers also questioned the relevance of ecology in the syllabus. The significance of these deficiencies to the effective teaching of Geography, Environmental Studies and should be noted and redressed.

The final report on the Intergovernmental Conference on Environmental Education, held in Tbilisi in 1977 (UNESCO-UNEP 1977), provided some guidance on environmental education processes in primary schools, encouraging the development of problem solving abilities and critical faculties within children. The internationally recognised Tbilisi Principles (UNESCO-UNEP 1977:27) which were formulated at the same conference, encourage the use of "diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience". The researcher feels that the existing tendency by teachers in Bophuthatswana to use teacher-centred teaching approaches limits the potential for children in school situations to develop critical faculties which may be needed in forming broad-based and balanced environmental perspectives.

The feelings of all the teacher groups indicated that to varying degrees a tension does exist between indigenous education and western education approaches used in the schools of Bophuthatswana. It is the researcher's opinion that this factor should be explored further, in an attempt to use the tension constructively in learning situations (Refer Sections 2.6.2 & 6.2.5). It is also acknowledged by the researcher, though, that such differences should not be used to emphasise cultural differences, or promote inferior educational processes as has been the case with Bantu Education processes (Kallaway 1990).

The inner conflict and tension that children are said to experience because of differences between indigenous knowledge systems and western education approaches, as expressed by the school teachers in this study, would also seem to indicate that traditional societal beliefs and values have not been adequately integrated into the National Curriculum Development processes of Bophuthatswana, despite the intention for this to have happened (Republic of Bophuthatswana 1978). Eisemon (1989:345) who recognised similar omissions in other

African countries, argues that, "Instruction in modern science in most African schools, though adapted to African needs and circumstances, takes no notice of indigenous African scientific beliefs." School-based science teaching and environmental education programmes in Bophuthatswana may be more effective if programme planners recognised that the knowledge students possess from social experience may be used to create better understanding of new concepts (Berger and Luckmann 1967).

The synergistic potential of bringing teachers into contact with the 'decision-makers' and enabling them to collaborate on improving existing curriculums and teaching approaches through, what O'Donoghue (1990:129) describes as an "...action-centred (school and field centres) process of reflective deliberation, problem solving and reconstruction" or 'contextual critical dialogue', cannot be over-emphasised. The limited resources available in developing societies require that every person's abilities should be harnessed and pooled in a collective attempt to improve such a vital process as education. This collaboration also enhances commitment and ownership to any innovation or change adopted.

A fundamental principle of action research is that various forms of action or output should be generated through the process of critical reflection (Refer Section 3.1.2). Through the action research processes of this study, a number of initiatives have been considered for the environmental education processes of the B.N.P.B. The programme used at the GFEE Centre has been evaluated by the staff there, with a view to improving teaching approaches and programme content. The conclusions of this evaluation supported the development of an Intensive Education Zone with a concentrated programme as originally proposed in 1987 (Hancock *et al.* 1987), to be developed near the GFEE Centre in the Pilanesberg National Park.

Preliminary discussion of these results has also stimulated discussion within the B.N.P.B. Environmental Education Section about the need to extend the existing twenty-four hour period allocated per school visit. The extra time allocated could be used to include educational activities aimed at stimulating a greater degree of affective change within the child through critical reflection on information provided during the stay at the GFEE Centre. The use of traditional story telling sessions, 'village theatre' projects in the evenings and

other teaching approaches relating to more traditional educational processes have also been considered.

The researcher has also made contact with the Bophuthatswana Department of Education's Primary Education Upgrading Programme (PEUP) in Mmabatho. A joint campaign to improve the teaching skills of *all* primary school teachers in Bophuthatswana has been discussed, where environmental education could be used as a vehicle to introduce creative teaching approaches to the teachers in schools (Refer Section 6.4.1 a, b, c & e). Provisional estimates have shown that it is possible to involve every Standard 3 and 4 teacher in a series of in-service training courses over a two year period. To this end an action research process involving the PEUP Regional Coordinators has been investigated (Holderness 1991 pers. comm.).

A further insight gained by the researcher has been that the potential exists for action research to be used in a wider context in schools. The creation of links with teachers in the community during this research has indicated that a wealth of enthusiasm and capability lies untapped in the schools. It is the researcher's intention to initiate a process of action research, based on similar lines to this research, introducing environmental education processes directly into schools with extended follow-up support and encouragement. Through this process it may be possible to facilitate the empowerment of teachers to reflect on the problems in their own teaching situation, and establish circles of supportive colleagues who can assist in creating change, and precipitating innovation within schools. It is also hoped that this process will result in teachers having a greater say in programme development and through this being able to create relevance in all learning experiences, and contextualise *all* learning experiences for children - not just those in the GFEE Centre.

6.4 CONCLUSION

The GFEE Centre has to-date largely structured its programme around the needs of the Bophuthatswana Department of Education's syllabuses, and school teaching needs (Refer Section 1.4.1). The teaching approaches adopted by the teachers at the GFEE Centre have

tended to be based largely on western teaching approaches, as has the Bophuthatswana schooling system in general. This study has attempted to investigate the programme content and teaching approaches at the GFEE Centre and the relationship of these to the BaTswana primary school children who visit. The main issues that the researcher identified during the study are discussed below.

In the view of the teachers in the study, the **environmental educational needs** of primary school children who visit the GFEE Centre relate to the developmental stage of the particular group. The data indicates that during the age group of 5-12 years of age BaTswana children's perceptions of how their world is constructed appear to conform to a narrow context of the family, home and immediate surroundings as do other cultures (Refer Sections 5.3.8 and 5.5.7). The teachers' descriptions of how children's worldviews develop are seen by the researcher to conform to the sequential processes outlined in developmental theories such as that of Piaget (Refer Section 2.3.3 and 2.3.4). The teachers' views together with literature on children's developmental processes indicate that these perceptions and worldviews are dynamic and evolve according to age and situational context. It is the researcher's opinion that BaTswana children's perceptions of the environment, *at these ages*, may not be vastly dissimilar across cultures.

The results from the main body of the research indicate that the school teachers participating in this study felt that Bophuthatswana children in Standards 3 and 4 have a broad awareness of their surroundings and neighbourhood - therefore environmental education learning experiences developed at the GFEE Centre may be enhanced by including examples from towns and rural areas. Matthews (1985:238) supports this with the conclusions developed from his research:

The results of this study confirm that children show higher levels of environmental skill when dealing with familiar places. This highlights the need to base junior school children's work on the concrete experience of their every-day world rather than on abstract studies which they are less able to visualise in a coherent manner.

Although this study failed to explore the affective element of BaTswana children's views of the environment, the teachers in Workshop One felt that BaTswana children did not have

strong emotional feeling towards the environment, viewing it in a utilitarian manner (Refer Table 5.2). The researcher noted that where the teachers in Workshops Two, Three and Four were asked to depict their views of how children would perceive the environment (Refer Tables 5.10; 5.13 and 5.19), none of the teachers mentioned that BaTswana children did have strong emotional feelings about the issue. The researcher realises though that despite the fact that such emotions or affective elements were not commented upon or identified, BaTswana children should have emotions that linked to their environmental worldviews (Refer Section 4.3.1).

Stapp (1978) has emphasised the importance of developing positive feelings about the environment in children from a young age. It is the researcher's feeling that the affective components of BaTswana children's perceptions of the environment need to be researched further if environmental education efforts in Bophuthatswana are to be optimised. The environmental education teaching approaches presently being used at the GFEE Centre, should therefore in the absence of further data, attempt to make sure that any environmental concepts being taught should not unduly separate cognitive and affective domains (Eisner 1982) but rather attempt to address both in each learning experience where possible.

It was the opinion of some of the teachers in the study that Bophuthatswana children might have a tendency to only relate the concept of 'environment' with game reserves (Refer Section 5.2.6 and 5.2.8), and therefore the teaching approaches adopted at the GFEE Centre should create more holistic perceptions in the children's minds, showing the local and global contexts of environmental issues.

Language needs were seen by the participating teachers to be dependant on the groups' backgrounds. The participants of the workshops concluded that concepts should be clarified in the mother-tongue if necessary, and that it was not essential that one dominant language should be used to ensure that conceptualisation occurred in the right context. The researcher feels that although the educational authorities in Bophuthatswana recommend that English should be used as the medium of instruction in standard 3 and 4 wherever possible, complex terminology that occurs in ecological and scientific concepts should be clarified where necessary to avoid misunderstanding - even if this requires that the mother-tongue is used.

The researcher feels that one of the most significant issues raised in the study is that, in the view of the sample group of Bophuthatswana teachers involved, **cultural backgrounds are considered to play a minimal role in the development of standard 3 and 4 BaTswana children's environmental perceptions and worldviews.** The researcher does concede though that culture may play a more important role during educational processes.

It was also the teachers' strong opinion that a predominantly rural or urban background during early childhood years may play a fundamental role in determining a child's environmental perceptions and worldviews (Refer Sections 5.2.8 and 5.5.7). These opinions were supported by literature relating to the issue (Refer Section 6.2.4). Many teachers felt that children brought up in an urban context would not be exposed to many natural elements of the environment and would then have a worldview which primarily consisted of elements and experiences of a man-made nature. Rural children would have less exposure to man-made and technological stimuli, providing them with a more nature orientated worldview.

Literature on the subject (Refer Section 6.2.4) inferred that an urban upbringing would give children a scholastic advantage by exposing them to technological and scientific stimuli, thereby assisting them in school subjects such as science and mathematics. The researcher feels though, that a rural background could provide many equally stimulating items and experiences that enhance both cognitive and especially affective domains within children. The literature also indicated though that the urban or rural background of a child did not appear to create differences in attitude towards the environment.

Teachers in three workshops felt that the cultural background of some BaTswana children often caused internal conflict or tension where indigenous knowledge systems experienced or used at home were not found to correlate to western education approaches found at school (Refer Sections 5.2.6; 5.3.6; 5.3.8 and 5.5.5). In the researcher's opinion, such tension when experienced in moderation may be considered to be a positive force in stimulating children to reflect on the issues involved and through this possibly create understanding, or enhance comprehension (Refer Section 6.2.5). If such tension was experienced to extreme degrees though, dysfunctional learning could result. The incorporation of some cultural elements from the child's background in a learning experience is considered by the researcher to be applicable in creating the right context for an optimal learning experience. Indigenous

knowledge such as the use of plants for medicinal purposes, and the significance of animals in tribal traditions, would provide a familiar and relevant foundation, which a child could readily relate to before moving on to unfamiliar concepts. The researcher feels though that care should be taken not to promote ethno-centric tendencies during this process.

It is the researcher's view that obtaining information about children's perceptions of the environment through a third party such as teachers, although enlightening, reduced the validity of any conclusions that may be made about BaTswana children's environmental worldviews. The information obtained directly from children, limited though it was, indicated that such research with children could provide valuable insight into their environmental perceptions and worldviews. Further research with children is therefore recommended.

The researcher's analysis of data in the study indicates that a number of problems exist within the educational system of Bophuthatswana itself. Institutional restrictions on teachers, their lack of confidence to break away from established teaching norms, and the need to innovate and develop good teaching approaches, are seen to be the most serious issues. Some of these problems could be addressed by encouraging responsible environmental behaviour through broad-based environmental education approaches in the schools of the country.

Finally, a meaningful result of this study has been the valuable insight that the researcher has gained about factors that influence environmentally orientated learning processes in Bophuthatswana. With this insight it has been noted that the GFEE Centre cannot operate as an isolated institution, and therefore it must become an integral process of a wider movement of environmental education within the country. A further result of this research has been the realisation by the researcher that the B.N.P.B. has an important role to play in the general education processes of the country, and through this achieve the environmental education objectives it has set itself.

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PERSONAL COMMUNICATIONS

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GUIDING PRINCIPLES FOR ENVIRONMENTAL EDUCATION

At the World Inter-governmental Conference on Environmental Education held at Tbilisi, U.S.S.R., in October 1977 TWELVE guiding principles for effective environmental education programmes were adopted.

Environmental education programmes should:

1. Consider the environment in its totality - natural and built, technological and social, economic, political, moral, cultural and historical, and aesthetic aspects;
2. Be a continuous life-long process; beginning at pre-school level and continue through all formal and non-formal stages;
3. Be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible an holistic and balanced perspective;
4. Examine major environmental issues from a local, national, regional and international point of view so that learners receive insights into environmental conditions in other geographical areas;
5. Focus on current and potential environmental situations while taking into account the historical perspective;
6. Promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems;
7. Explicitly consider environmental aspects in plans for development and growth;
8. Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
9. Relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;
10. Help learners discover the symptoms and real causes of environmental problems;
11. Emphasise the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;
12. Utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.

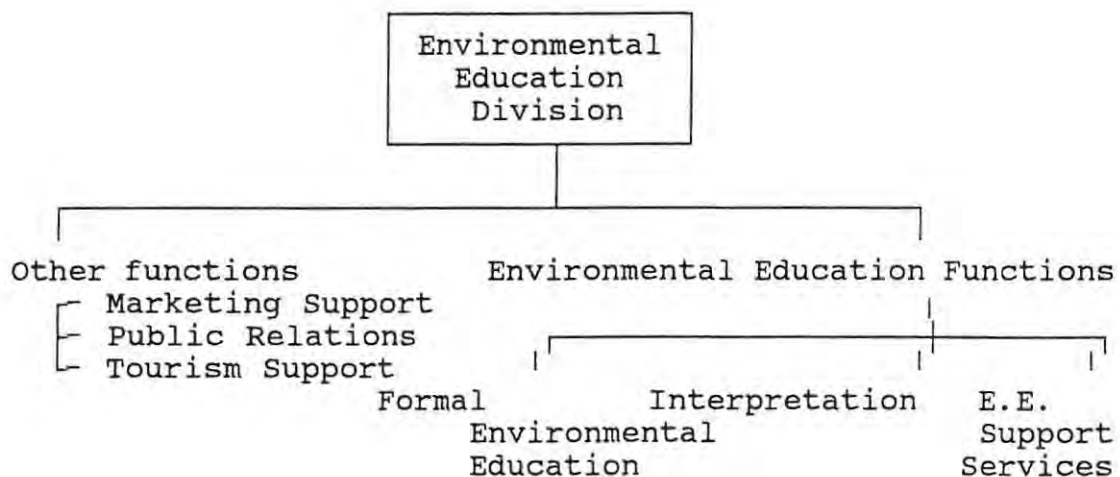
Bophuthatswana National Parks Board

OPERATION POLICY : ENVIRONMENTAL EDUCATION : 1986

1. PREAMBLE

The National Parks Board of Bophuthatswana has decided, as far as possible, to accept the international meaning attributed to both environmental and educational terms used in the document. In its structuring of the policy, including those aspects related to interpretative and extension services, the Board has viewed education as a process towards an outcome of progressive awareness. The Board has been influenced by modern educational research, ideas and trends in curriculum design. It is also accepted and understood that education is not a financially self-supporting operation. Environmental education is seen rather as a commitment of the Board towards long-term benefits for the people of Bophuthatswana.

The following diagram represents the Board's conceptual view of environmental education within the Environmental Education Division. The various functions and operations are viewed as parts of an integrated whole rather than as isolated components.



2. KEY OBJECTIVE

The objective of this environmental education policy is to enable the people to develop, through appropriate education, a national sense of environmental awareness, which is behaviourally affective in conservation terms, and which satisfies the identified needs of Bophuthatswana.

By this is meant promoting peoples' awareness of their relationship with nature, thereby enabling them to live sustainably within the (physical and biological) constraints of the

environment. This includes an appreciation of the value of indigenous flora and fauna in the country, and of Parks and Wildlife Estate. Also incorporated is a desire to encourage an improvement in the general quality of life of the people of Bophuthatswana through conservation orientated behaviour in their domestic and agricultural life.

3. DEFINITIONS

For the purpose of this policy document the following working definitions have been accepted :

3.1 ENVIRONMENTAL EDUCATION

The I.U.C.N. definition of environmental education was accepted in its entirety viz.

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality.

It should be noted that it is concerned with both knowledge and values. It is furthermore accepted that 'ultimately the behaviour of entire societies towards the biosphere must be transformed if the achievement of conservation objectives (outlined below) is to be assured. A new ethic embracing plants and animals as well as people is required for human societies to live in harmony with the natural world on which they depend for survival and well-being. The long-term task of environmental education is to foster or re-enforce attitudes and behaviour compatible with this new ethic.' (World Conservation Strategy 1980). This does not preclude environmental education being on occasion used a tool of management.

The 11 Guiding Principles for effective environmental education programmes developed at the 1977 Tbilisi Conference are accepted in their entirety. (Refer Appendix A).

For purposes of this document environmental education is seen to be achieved through Formal Education activities, Interpretation Activities, and Educational Support Services (which include extension type activities), notwithstanding the fact that Interpretation and Educational Services have other functions in their own right.

3.2 ENVIRONMENTAL AWARENESS

Environmental awareness refers to the level of knowledge, consciousness and state of awareness about the environment and environmental issues, including the need for conservation.

Awareness is composed of factual knowledge, conceptual knowledge and understanding (including ethical aspects) and the attitude resulting from these. Awareness may be termed 'high' or 'low' depending on the degree to which it is in harmony with its object of intention.

Environmental awareness is a product resulting from the process of environmental education but is not easily quantifiable or measurable.

3.3 FORMAL EDUCATION SERVICES

Formal Education Services are for the purpose of this document defined as all the planned educational activities, other than those covered by 'interpretation' and 'education services' (q.v.), carried out by the Board and its staff. This includes inter alia courses operated for school pupils, teacher trainees and other situations where the audience is involuntary present.

3.4 INTERPRETATION

Following Tilden (Interpreting our Heritage 1967) interpretation is 'an educational activity which aims to reveal meaning and relationships through the use of original objectives by firsthand experience, and by illustrative media rather than simply to communicate factual information.' It is thus concerned with enhanced understanding and increased enjoyment of nature.

3.5 EXTENSION

Extension is an educational activity concerned with the transmission and propagation of knowledge and associated physical skills. It is the function of extension to enable people to identify and assess their own needs, to help them to acquire knowledge and understanding to solve their problems and to inspire them to appropriate action.

3.6 The terms FORMAL, NON-FORMAL and INFORMAL EDUCATION are accepted as defined in the 1981 H.S.R.C. Investigation into Education viz.

3.6.1 FORMAL EDUCATION is provided in a planned way at recognized institutions such as schools, colleges, technikons and universities.

3.6.2 NON-FORMAL EDUCATION is broad in scope, and in the words of the Main Committee, 'is directed towards literacy, induction, in-service training, retraining, support programmes (for parents, for example), ad hoc needs, a second chance for those who either never entered the formal system or left it early, upgrading of individuals with inadequate educational levels so that they can re-enter the formal system, satisfying the demand for leisure time activities.

Non-formal education must be provided alongside formal education, and schools could be involved in non-formal education by becoming community learning centres.'

3.6.3 INFORMAL EDUCATION occurs spontaneously in situations within the family circle, the neighbourhood, and so on. Many forms of the media (from the picture and the book to radio and television) contribute to the informal education of the individual. The quality of informal education to which an individual is exposed

will have a bearing on the value he will derive from the provision of formal education as well as from non-formal education.

3.7 CONSERVATION

The term 'conservation' is taken to mean 'the management of the human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations. Thus conservation is positive, embracing preservation, maintenance, sustainable utilisation, restoration and enhancement of the natural environment.' (World Conservation Strategy 1980).

Conservation is development for people. Its concern for maintenance and sustainability is a response to both the nature of living resources and also an ethical imperative.

Conservation is a process and way of life to be applied right across all aspects of society.

3.8 MANAGEMENT

Management (of renewable natural resources) is the action taken based upon knowledge gained from ecological studies, to achieve a desired and prescribed objective. Management therefore, is applied ecology. The management objective is the product, of which management is the process.

Conservation (the wise use of renewable natural resources for the benefit of man) and preservation (the protection of 'unsafe' species of animals and plants and/or communities of animals and plants) are the two principal arms to renewable natural resource management. Whereas these two important arms of management greatly overlap in their practical application, their separate concepts are clearly distinct.

3.9 The term 'the COMMITTEE' shall throughout the document refer to the Environmental Education Committee of the Board.

4. ENVIRONMENTAL EDUCATION COMMITTEE

The Board will set up a permanent committee on environmental education.

4.1 COMPOSITION OF THE COMMITTEE

The committee shall consist of;

- * A chairperson who will be a member of the Board.
- * The head of the Environmental Education Division
- * Any other individuals who for reasons of particular skills of expertise whom the Board, or the committee with Board ratification, wish to nominate. The committee should include at least one professional educationist.

* Members of the directorate who will be ex-officio members of the committee.

Provision should exist for corresponding/consultative members who would not necessarily attend all the meetings of the committee, but whose professional expertise can nevertheless be called upon when needed. It will be the responsibility of the chairperson to keep such members informed of all activities of the committee. Membership of the committee should be reviewed periodically by the Board.

4.2 MEETINGS

The committee shall meet on a regular basis and whenever necessary. It is the duty of the chairperson to act as convenor.

4.3 GENERAL FUNCTIONS OF THE COMMITTEE

4.3.1 Environmental education programmes will be fostered and encouraged within all formal educational institutions in Bophuthatswana. Strong co-operation between the Board's staff and these institutions will also be encouraged.

4.3.2 Environmental education will be encouraged within all organizations concerned with non-formal and informal education in Bophuthatswana

4.3.3 A high level of contact between the Board's officers and existing extension-oriented infrastructures will be encouraged in order to ensure co-operation and co-ordination of activities.

4.3.4 Procedures for the evaluation and monitoring of environmental awareness and environmental education programmes will be established and, where pertinent, applied.

4.3.5 Practical conservation and affective conservation behaviour will be encouraged at a local level throughout the country - so that Parks and Estates do not become isolated ecological islands.

4.3.6 The committee will develop, in consultation with staff, the broad-based educational strategies of the Board (including critical objectives for each section of environmental education) and will review and evaluate these strategies on an annual basis.

This activity will incorporate :

1. The identification of areas and issues to be given educational priority.
2. Responsibility for identifying target groups and delineating communication avenues in order to achieve the key objective.
3. The production of guidelines for the development and evaluation of all environmental education programmes.
4. Determining which sections of the communication division should achieve the environmental education objectives set by the Board through its committee.

4.3.7 The committee will co-ordinate the functional relationship between environmental education and public relations inasmuch as public relations has a bearing on environmental education.

4.3.8 All environmental education programmes, courses and teaching/instructional methods may be monitored and evaluated by the committee (see 4.4.2 below)

4.3.9 The committee may act in a consultative or supportive role for sections of the communications division and its staff in order to facilitate aspects of their work.

4.3.10 To participate in the drawing up of budgets and in recommending the extent to which various educational activities should be subsidized (see 4.4.5. below).

4.4 OPERATIONAL PARAMETERS

4.4.1 The various sub-sections within the Environmental Education Division are to operate in a closely integrated manner under the direction of the head of Environmental Education.

4.4.2 All environmental education programmes run by the Board will be of an educationally sound nature to be evaluated and monitored on a regular basis. There shall be adequate planning to achieve approved standards and at all times modern and progressive educational ideas and practice shall be taken into account (see 4.3.8 above).

4.4.3 All audio-visual and other materials developed and implemented by the Board will be based on sound communication principles and presented in an appropriate language.

4.4.4 Cost to benefit ratios should, wherever possible and reasonable, and subject to the normal constraints operating in an educational milieu, be maximized.

4.4.5 The costs and extent of subsidization of educational programmes shall be determined by the Board on an annual basis. The head of the Env. Education Division shall, in consultation with the committee and appropriate members of the directorate, be responsible for the preparation of budgets, cash flow charts and financial projections (see 4.3.10 above).

4.4.6 The prioritized bookings for overnight accommodation for educational purposes shall be controlled by the committee or a delegated officer, in co-operation with the tourism section of the Board.

4.4.7 The development of all educational facilities operated by the Board within or outside of its Estate shall be done in consultation with the committee.

4.4.8 All aspects of this policy shall be subject to constant review, evaluation and monitoring by the Board and /or its committee on environmental education.

5. REFERENCES USED IN THE COMPILATION OF THE POLICY

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- SHARPE G.W. (ed.) (1976) *Interpreting the Environment*. John Wiley & Son: New York.
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CHARACTERISTICS OF CHILD-CENTRED (PROGRESSIVE) AND
SUBJECT-CENTRED (TRADITIONAL) TEACHING APPROACHES.

Progressive	Traditional
1. Integrated subject matter	1. Separate subject matter
2. Teacher as guide to educational experiences	2. Teacher as distributor of knowledge.
3. Active pupil role	3. Passive pupil role
4. Pupils participate in curriculum planning	4. Pupils have no say in curriculum planning
5. Learning predominantly by discovery techniques	5. Accent on memory, practice and rote
6. External rewards and punishments not necessary intrinsic motivation	6. External rewards used for example, grades, ie. extrinsic motivation
7. Teachers give as high priority to social and emotional development as to academic attainment	7. Teachers give highest priority to academic attainment
8. Little testing	8. Regular testing
9. Accent on co-operative	9. Accent on competition
10. Teaching not confined to classroom base	10. Teaching confined to classroom base
11. Accent on creative expression	11. Little emphasis on creative expression

(From Bennett 1987:46)

GROUP DYNAMICS OF WORKSHOPS TWO, THREE & FOUR

The researcher's observations of the group dynamics (Beale *et al.* 1962:103-109) within the proceedings were noted within each of the Workshops Two, Three and Four.

Workshop Two

- a) within the category of Group Task Roles, the process was largely dominated by a few elderly male 'information givers' who are categorised as people who "offer facts or generalizations which are 'authoritative' or which relate to (their) own experiences pertinently to the group problem. A number of elderly female 'coordinator-integrators' continuously attempted to "clarify the relationships between various ideas and suggestions, and (tried) to extract key pertinent ideas from members contributions and integrate them into a meaningful whole."
- b) in the category of Group Building and Maintaining Roles, again the 'standard setter or ego ideal' group of men tended to try to direct the pace of the discussion, with a few people adopting the role of 'harmonisers' and 'compromisers', though many of the younger teachers adopted 'follower' roles and often held neutral stances.
- c) there was one main type of Individual Role adopted - that of the 'dominator' who is seen to "assert authority or superiority in manipulating the group or certain members (by) assertion of a superior status.. (or) authoritative behaviour...".

Workshop Three

The Group Dynamics (Beale *et al.* 1962:103-109) observed in this workshop showed in the functioning of Group Task Roles that a greater range of roles were exhibited, including 'initiator-contributor', 'information seeker', 'information-giver', 'elaborator', 'coordinator-integrator' and 'disagreer'. The group-centred function of Group Building and Maintenance Roles, also showed a more accommodating attitude from all participants compared with that of Workshop Two. There were fewer 'followers', and everyone felt at ease to contribute with confidence and recognition. Individual Roles were not very evident as group cohesiveness had been achieved, with everyone subordinating their own interests to those of the larger group's goals.

Workshop Four

Analysing the Group Dynamics (Beale *et al.* 1962) of this workshop, it was noted that as far as Group Task Roles was concerned a potentially domineering 'information giver' was suppressed by group processes, allowing a good balance of 'initiator-contributors', 'information seekers', 'coordinator-integrators' and 'disagreers'. With regard to the Group Building and Maintenance Roles, the group was generally 'group-centred', but occasionally certain participants adopted the roles of 'encourager' and 'harmoniser' to facilitate deadlocked debate. Individual Roles were not very evident, and were subordinated to the greater good of the group's needs.

From: Beal G.M., Bohlen J.M. & Raudabaugh J.N. (1962) Leadership and Dynamic Group Action. The Iowa State University Press. Iowa.

Sample of standard four pupils' answers on perceptions of the environment.

Independent research undertaken by Maremane (Refer Section 5.4). *Original spelling and grammar of the respondent have been retained.*

Answer to question "What is your idea of the term environment?"

Environment is a thing soround us in nature like we (the) environment of our school village and so on. I must have to learn environment like we have blookes trees garden is our school environment. Our village environment is churches schools houses shops and is our village environment. We have different trees.

In environment we have animals peoples trees those are environment. We have some are living some are non living. Animals have environment in bush. Environment is always near us not far us. Our environment have singers players cleaners poice doctors teachers.

We have rivers churches hospitals shops is a environment. Our environment is we play balls with the school near us we sing with choirs near us.

The name of our environment is machama, matueno, ramono, kgamanyane, ofentse, mmamitlwa and so on. Our environment shops, modderkuil cafe Tamatie, morukhu, gaaitate maskhana. Our environment church, dutch Zion broer and sister, postol SunJohn is our environment.

Teachers own perceptions: Ranked averages of categories.

(Refer Workshop Two: Table 5.8)(N=15)

Category	Average mentions of category per participant
1 Natural area/things*	1,466
2 Wild animals	1,200
3 Tree	0,933
4 Soil	0,933
5 Plants/bushes	0,933
6 Houses/buildings	0,933
7 Pollution/litter	0,933
8 People	0,800
9 Farm items	0,733
10 Cultural items	0,666
11 Erosion/dongas	0,466
12 Water	0,466
13 Wild birds	0,466
14 Work areas	0,400
15 Roads	0,333
16 Domestic animals	0,266
17 Gardens	0,266
18 River	0,266
19 Grass	0,200
20 Mountain	0,200
21 Land	0,200
22 Air	0,133
23 Hospital	0,133
24 Town/village	0,133
25 School	0,133
26 Money	0,133
27 Police	0,133
28 Misc. Man-made	0,933
29 Misc. Natural	0,333

* = Mention of natural resources, natural areas, minerals etc

Teachers own perceptions: Ranked averages of categories.

(Refer Workshop Three: Table 5.12)(N=8)

	Category	Average mentions of category per participant
1	Natural area/things*	1,125
2	Wild animals	1,125
3	People	0,875
4	Soil	0,750
5	Dongas/erosion	0,625
6	Trees	0,625
7	Grass	0,500
8	Roads	0,500
9	Pollution/litter	0,375
10	Plants/bushes	0,250
11	Wild birds	0,250
12	Land	0,250
13	Dump sites	0,250
14	Water	0,125
15	River	0,125
16	Flowers	0,125
17	Houses	0,125
18	Dams	0,125
19	Town/village	0,125
20	School	0,125
21	Farmyard	0,125
22	Domestic animals	0,125
23	Church	0,125
24	Food	0,125

* = Mention of natural resources, natural areas, minerals etc

Teachers own perceptions: Ranked averages of categories.**(Refer Workshop Four: Table 5:18)(N=9)**

	Category	Average mentions of category per participant
1	Natural area/things*	2,111
2	Wild animals	2,111
3	Tree	1,777
4	People	1,444
5	Cultural items	1,111
6	Plants/bushes	1,000
7	Grass	0,666
8	Donga/erosion	0,666
9	Soil	0,555
10	Buildings	0,555
11	Roads	0,555
12	Farming items	0,555
13	Dams	0,444
14	Pollution/litter	0,444
15	Wild birds	0,444
16	Water	0,444
17	Flowers	0,333
18	Work area	0,333
19	Town/village	0,222
20	School	0,222
21	Food	0,222
22	River	0,222
23	Land	0,222
24	Misc. Man-made	0,555
25	Misc. natural	0,444

* = Mention of natural resources, natural areas, minerals etc