

**AN EVALUATION OF THE INTERDISCIPLINARY
NATURE OF ENVIRONMENTAL EDUCATION
IN COLLEGES OF EDUCATION
IN BOPHUTHATSWANA**

BY

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ABSTRACT

This study was aimed at evaluating the interdisciplinary nature of environmental education within the colleges of education in Bophuthatswana. Data collection was based on semi-structured interviews with college lecturers and, to a lesser extent, on observations during a workshop with environmental educators from Bophuthatswana. Knowledge was gained about college related factors which influence the varying extent to which environmental education is being implemented within the colleges of education. Lecturers' understanding of the interdisciplinary nature of environmental education and related concepts was explored. Insights were also gained into problems of implementation which included lecturers' limited understanding of the concept of interdisciplinarity, structural ambiguities, limited training and experience, and a lack of clarity in both local and international literature on environmental education concepts and terms.

Specifically the study sought to illuminate the dichotomy between theory and practice, the conflict between the dominant curriculum paradigm and the new emerging paradigm, and tensions between the interdisciplinary nature of environmental education and subject-based disciplines, which lead to problems of implementation.

The study could make an important contribution to the current curriculum debate on environmental education in South Africa by illuminating the dichotomy between the theory and the practice of environmental education, and the problems involved in translating interdisciplinary approaches into workable classroom practices within discipline based curriculum structures.

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CHAPTER 1

INTRODUCTION

The need for environmental education to address the environmental crisis, the importance of the role of teachers in environmental education, and the ensuing need for teachers to be adequately trained in environmental education, are well documented internationally (UNESCO-UNEP 1978a). However, it has been observed by Wilke *et al.* (1987) that few if any teacher training programmes adequately prepare teachers to effectively teach environmental education in their classrooms. This observation justifies the call by at least two United Nations conferences (UNESCO 1980, UNESCO-UNEP 1988) that research into teacher education programmes should be made a priority in the process of promoting environmental education.

Increasing international calls for environmental education went up in response to a growing awareness of an environmental crisis which threatens the very existence of mankind (Bennet 1985). Guidelines and principles to inform the teaching of environmental education have been formulated at two major international gatherings at Belgrade in 1975 (Fensham 1976) and at Tbilisi in 1977 (UNESCO-UNEP 1978). Amongst these was the guideline that environmental education should be taught on the basis of an interdisciplinary approach, as outlined in the now widely referred to Tbilisi Principles (UNESCO-UNEP 1978) and as subsequently justified by numerous authors (UNESCO-UNEP 1985, Parry 1985, Lucko *et al.* 1987, Stevenson 1987, Orr 1990, Fien 1991 and Gough 1991).

The international literature gives several accounts of the 'interdisciplinarity' of environmental education and how it can be achieved in the school context (UNESCO-UNEP 1985b, Stevenson 1987, Fien 1991).

Bennet (1985) noted that environmental education is characterised by several approaches to learning and methods of teaching. He mentioned an interdisciplinary approach as one of the most distinguishing characteristics of environmental education arguing that:

knowing how to select and apply these approaches efficiently is of crucial importance. It is to this end that evaluation of instructional programmes is to be directed.(p.14).

However, there seems to be a degree of ambiguity on what an interdisciplinary approach to environmental education is, and how it can be translated into actual classroom practice. For example:

If we try to analyse the present state of the concept of interdisciplinarity, as it is practised in [environmental education], we find it difficult to define its status or extent clearly. Ambiguity appears immediately in the multitude of synonyms for interdisciplinarity (UNESCO-UNEP 1985b.p.8)

This observation by two highly reputed institutions like the United Nations Educational Scientific and Cultural Organisation (UNESCO) and the United Nations Environment Programme (UNEP), with a history of involvement in environmental education, suggests the widespread nature of the problem and an urgent need to address it.

An analysis by UNESCO/UNEP of international publications indicated that the following terms are often used interchangeably (UNESCO-UNEP 1985:p.8):

- pluridisciplinary
- multidisciplinary
- transdisciplinary
- polydisciplinary
- juxtadisciplinary

To the above the researcher would add the terms

- holistic (UNESCO/UNEP 1978b)
- integrated (Harod 1989)
- cross-curricular (Ben-Peretz 1978)

which also seem to be used in environmental education and curriculum documents to mean the same as interdisciplinary.

It has been noted that the term interdisciplinary

crops up in ministerial circulars and instruction in many countries. Sometimes they even attach value to it. But in the reality of the classroom, its qualitative and quantitative importance is still slight (UNESCO-UNEP 1985b.p.10)

A lack of clarity on the meaning of the concept of interdisciplinarity might account for the insignificant impact it has in the classroom. If however, interdisciplinarity is an important principle of environmental education, as argued by Bennet (1985) and others,

then there is a need to seek clarity on the concept, as well as a need to investigate how interdisciplinarity is currently implemented in the classroom. As noted by UNESCO-UNEP (1985b:p.43):

If progress is to be made in this field of environmental education, it is increasingly necessary for what is really happening in the classrooms be analyzed instead of limiting ourselves to a vague idea of what teachers and teaching teams have to do or think they are doing.

This need for analysis of classroom situations and practice of environmental education applies, in the view of the researcher, also to colleges of education in Bophuthatswana. Environmental education was introduced at the University of Bophuthatswana at both under-and post-graduate levels in the 1980's (Irwin 1991). In 1986, based on the recommendations of Irwin, a prominent local environmental educationist, environmental education was also introduced in the then five colleges of education in Bophuthatswana. It was based on the principles and guidelines provided by the Tbilisi Conference, and the proposal was that, in accordance with the Tbilisi Principles, environmental education was to be, amongst other things, interdisciplinary in its approach (Irwin 1981).

In the experience of the researcher (himself a lecturer in Fine Art and Environmental Education at a college of education in Bophuthatswana), aspects of environmental education including an interdisciplinary approach, are currently issues of concern amongst environmental educators at the colleges. This was verified as having an impact on the implementation of environmental education, at a recent workshop held under the auspices of the Bophuthatswana National Parks Board (BNPB), where the theme was environmental education approaches and the focus was on the interdisciplinary nature of environmental education (Appendix 4,5 and 6).

Based on formal and informal discussions with environmental educators at the workshop and other less informal meetings, the following college related factors were noted as also having a possible influence on the implementation of environmental education:

- In three of the colleges, the study of environmental education was restricted to certain diploma groups e.g. students in the primary diploma group could study environmental education, but not those in the secondary diploma. This was a matter of college policy. It seemed to the researcher that the status of

- environmental education tended to be higher in those colleges in which environmental education was studied by the widest cross section of students.
- The nature of subject grouping in colleges seemed to have an impact on the degree to which environmental education was implemented. In colleges in which environmental education was grouped with subjects with which it was incompatible in terms of timetabling, this tended to affect the implementation of environmental education adversely. For example, in a college in which environmental education was timetabled with practical subjects such as Needlework, Fine Art and Music, three periods en-block were allocated to the subjects per week. Lecturers complained that this was detrimental to the effective teaching of environmental education.
 - The researcher also observed that in colleges in which practical subjects were dominant, there seemed to be dwindling student numbers in environmental education classes. Some of the practical subjects are not formally examined (as environmental education is) and therefore students tended to drift to those subjects. This seemed to affect the morale of environmental education lecturers and subsequently the teaching of environmental education. In colleges in which environmental education was a compulsory course, there seemed to be great enthusiasm on the part of students and lecturers.
 - The vigour with which environmental education was pursued in a college seemed to have an impact on the degree of success of the implementation of the course and on gaining support and encouragement for environmental education from college authorities. The personalities of the lecturers who taught the course seemed to have a bearing on how vigorously environmental education was pursued in a college. A lecturer's personal commitment to environmental education seemed to have the effect of getting students to be more actively involved in the course.
 - The length of time that environmental education has been taught in a college seemed to be related to how successful or otherwise the course was implemented. In colleges in which environmental education has been taught for a long time, there appeared to exist a firmly established environmental

education tradition. In colleges in which the course has been newly introduced, environmental education seemed to be in its infancy.

- The curriculum policy on environmental education of the Institute of Education of the University of Bophuthatswana seemed to influence how well the course was implemented in various colleges. From the beginning of 1993, three colleges were earmarked to implement environmental education as a major course. This meant that environmental education was on an equal footing with other major courses in those colleges. This situation had the advantage of giving lecturers in those colleges adequate number of teaching periods for environmental education on the college timetables. In the other colleges, environmental education remained as an ancillary course with the time constraints associated with it. The exception being one college where environmental education remains as an enrichment course.

The above provides the background to the motivation for undertaking this study. It is an attempt to illuminatively evaluate the interdisciplinary nature of environmental education in colleges of education in Bophuthatswana by:

1. exploring the perceptions or understandings of college lecturers of the interdisciplinary nature of environmental education, including related terms such as cross-curricular, integration, holistic and multidisciplinary,
2. exploring the problems, if any, which environmental educators in colleges experience with the possible duality between an interdisciplinary environmental education curriculum on the one hand, and subject-based disciplines on the other,
3. investigating how college lecturers deal with such problems.

This study is essentially an illuminative evaluation of a teacher education programme, with the aim of developing insights into the selection and implementation of specific approaches to environmental education, in particular that of an interdisciplinary approach.

The study also necessitated a thorough review of the literature, presented in Chapter 2. It focuses on the nature of the dominant compartmentalised worldview from a historical perspective, the role of this world view in the global environmental crisis, and the ensuing need for environmental education based on an interdisciplinary perspective. The chapter also gives a brief account of the history of the development of environmental education in Bophuthatswana and South Africa, and of the illuminative evaluation model used in the study.

The study has been undertaken through the method of a small-scale interview survey within an ethnographic approach, as described in Chapter 3. This chapter also describes the paradigmatic framework of the research, and the data collection techniques, of participant observation in workshops and semi-structured interviews. The data analysis was both quantitative and qualitative.

The results of the study are described and discussed in Chapters 4 and 5. Chapter 4 focuses on the lecturers' understandings of certain environmental education concepts, such as interdisciplinarity, while Chapter 5 describes and discusses results relating to the problems they experience with the implementation of environmental education, with specific reference to interdisciplinarity. Chapter 6 concludes the research findings and includes proposals and an evaluation of the research design.

CHAPTER 2

LITERATURE REVIEW

INTRODUCTION

Fundamentally, the need for environmental education arises from the need for an environment 'fit for life' (i.e. a healthy and healing environment) (Bennet 1985). The need to protect and maintain such an environment is a human responsibility, and the role of education (in the form of environmental education) has received widespread recognition in recent years as a means of meeting this responsibility (Bennet, 1985). Many goal statements have been suggested which reflect this responsibility. One on which there is wide agreement is the Belgrade charter A Global Framework for Environmental Education (1975):

The goal of environmental education is to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge, skills, motivation and commitment to work individually and collectively towards solutions to correct problems and the prevention of new ones. (Bennet, 1985 p.11)

It is important that from time to time, environmental education practitioners examine their practice and its outcomes to ascertain whether these goals are being met. Nevo (1983) has noted that one cannot be engaged in an educational enterprise or do training without doing some evaluation of goals, needs, designs, implementation activities and immediate as well as longer term effects of the educational process. Available literature however suggests that not much is being done in this direction in South Africa and Bophuthatswana. Hurry (1982), O'Donoghue (1986), Leketi (1992) and Shongwe (1992) have noted that very little systematic evaluation of the effectiveness of environmental education programmes has taken place, but this trend seems to be gradually changing (Irwin 1993). A 1987 survey in Australia identified programme evaluation and teacher effectiveness in environmental education as areas needing serious and immediate attention. Lucko *et al.* (1987), have noted:

... the time is now appropriate for those familiar with the goals of environmental education as now generally accepted, along with those individuals knowledgeable concerning assessment procedures to review the area and its impact on individual students and educational enterprise (p.8)

This assessment is particularly important in the area of teacher education given the important role of teachers in bringing about the realisation of the goals of environmental education (UNESCO/UNEP 1978a). This has been widely recognised as a main priority for research and action in environmental education (UNESCO-UNEP 1980, Wilke *et al.* 1981). Trainer (1990) has noted the following about the role of teachers in the implementation of environmental education programmes:

If environmental education is one of the social agencies through which the transformation of an ecologically sustainable society is to be achieved, then the role of teachers as change agents is vital.

Several writers like O’Riordan (1981), Wilke *et al.* (1981), Musonda (1986), Gough (1990) and Fien (1991) have however noted that environmental educators face problems which make the effective implementation of environmental education programmes difficult. They cited class size, lack of logistical support, teaching resources, school organisation, finance, timetable, teacher competence and curriculum interpretation as examples of such problems. It is the view of Parry (1985) that a need exists for research to provide detailed information about how schools and teachers actually develop and implement environmental education curriculum. This he argued might enable better informed planning of curriculum and teaching resource materials to be undertaken, which in turn might make the goals of environmental education easier to achieve. With teacher competence as a factor mentioned, the role of tertiary institutions in teacher education then come into sharp focus. In the experience of the researcher, a need for evaluation of environmental education practice certainly exists in teacher education institutions in Bophuthatswana.

The following areas are addressed in the review of literature relevant to this study. They are:

- The nature of the dominant reductionistic-mechanistic world view.
- Philosophical and epistemological basis of compartmentalisation.
- An interdisciplinary approach to environmental education as an alternative curriculum paradigm. The nature of the emerging worldview.
- The emergence of environmentalism and environmental education.
- International debate on approaches to environmental education.
- The need for research into the practice of environmental education.
- Environmental education in South Africa and Bophuthatswana.
- Illuminative evaluation as an approach to this study.

THE NATURE OF THE DOMINANT REDUCTIONISTIC-MECHANISTIC WORLDVIEW

In recent years, much has been written about the dominant curriculum framework which operates in the Western industrial world and which has also influenced the thoughts, actions and perceptions of many people in other parts of the world (including South Africa). The world view underpinning this curriculum framework has been described as "reductionist-mechanistic", or "atomistic". (Emery, 1981; Harman, 1985; Gough, 1991).

A reductionist-mechanistic perspective sees the world as divided into separate entities, the sum of which constitute the whole. This perspective gives rise to a view of humans as separate from the biophysical environment over which they are deemed to have control. The separation of the human mind from emotion is also a feature. The emphasis is on objectivity, individual development and rights, as opposed to subjectivity, collective social responsibilities and rights (Gough 1991).

Though a lot of material progress was made by mankind as a result of influences of the reductionistic-mechanistic perspective, much damage has been done and continues to be done, particularly to the global environment. The losses have come about as a result of mankind's firm and uncritical convictions in scientific knowledge and approaches as the only valid forms, to the negation of other approaches and forms of knowledge e.g. practical skills and concern for nature; the view of the universe as a mechanical system, negating the mysticism and divinity associated with creation; the view of life in society as a competitive struggle for existence instead of co-operation, collective responsibility and co-existence; the belief in material progress to be achieved through economic and technological growth, negating spirituality and failing to acknowledge limits to economic growth and development and thereby adhere to human scale technology (Gough 1991).

In formal education, the reductionistic- mechanistic world view has lead to a strong emphasis on analytical thinking, rational skills, separate subjects and specialisation as well as competition for domination (Harman 1985). These characteristics of modern education have been implicated in the global environmental crisis (UNESCO/UNEP 1985a).

If there are environmental problems today, it is partly because very few people have been prepared to correctly analyse and effectively solve concrete and complex problems. Overly abstract overly compartmentalised education has ill-prepared people to face the changing complexity of reality (UNESCO/ UNEP 1985a p.16).

Whitehead (1967) pointed out that the compartmentalisation of knowledge into subject disciplines, which is usually accompanied by high levels of abstraction and professionalism, has serious flaws which are usually overlooked. He noted:

The disadvantage of exclusive attention to a group of abstractions, however well-founded, is that by the nature of the case, you have abstracted from the remainder of things. Insofar as the excluded things are important in your experience, your modes of thought are not fitted to deal with them (p.200)

Whitehead further observed that learners who are subjected to a compartmentalised curriculum and high levels of abstractions based on the reductionistic mechanistic world view, tended to lack balance in their perceptions. He argued that such people tended to "see this set of circumstances or that set, but not both sets together"(p.146). These views are relevant to environmental education in the sense that environmental problems which are partly caused by compartmentalisation, Capra (1983), seem to defy solutions because of fragmented frameworks of knowledge with which to deal with them. Capra has pointed out that compartmentalisation results in people perceiving global issues from narrow and disjointed perspectives. He observes:

It is a striking sign of our time that people who are supposed to be experts in their various fields [of study i. e. disciplines] can no longer deal with the urgent problems that have arisen in their area of expertise. Economists are unable to understand inflation, oncologists are totally confused about the causes of cancer, psychiatrists are mystified by schizophrenia, police helpless in the face of rising crime.....(p.5)

Critics of the reductionist-mechanistic paradigm like Capra (1983) Robottom (1987), Greig *et al.* (1987), Orr (1990), Gough (1991), have argued that the causes of global environmental crisis of dwindling natural resources, deforestation, desertification and famine, over-population, pollution, the depletion of the ozone layer, the threat of nuclear war, toxic waste management and disposal, militarisation, global poverty can all be attributed in part, to the crippling inadequacies of the reductionist-mechanistic world view. The critics provide a link between environmental problems and the reductionist-mechanistic perspective and they blame mankind's failure to solve these

problems on the shortcomings of the dominant curriculum framework. Capra (1983) has further noted:

The over emphasis on the scientific method and rational, analytical thinking, has led to attitudes that are profoundly anti-ecological. In truth the understanding of ecosystems is hindered by the very nature of the rational mind..... One of the most difficult things people in our culture (Western culture) do not understand is the fact that if you do something that is good, then more of the same will not necessarily be better (p.25)

It is as a result of mounting global environmental problems and mankind's apparent inability to solve them that writers like Ash (1980), Harman (1985), Spretnak and Capra (1984), Robottom (1987) and Orr (1990) have called for a shift from the dominant reductionist-mechanistic world view which underpins compartmentalisation, to a new world view. According to Harman (1985), the latter is characterised by an emphasis on whole-system perspective, ecological consciousness, transmaterialism, cultural pluralism, human scale technology and solidarity with developing countries. Other advocates of this "new paradigm" are less specific about its characteristics and suggest instead a new understanding of scientific theories emerging from recent work in cosmology, quantum mechanics and thermodynamics (Prigogine 1980, Briggs et al. 1984, Prigogine and Stengers 1984).

Before touching on the nature of the emerging paradigm, the philosophical and epistemological underpinnings of the reductionist-mechanistic world view will be explored. Understanding the philosophical basis of compartmentalisation puts one in a better position to deal with problems in order to effect meaningful and workable changes.

PHILOSOPHICAL AND EPISTEMOLOGICAL BASIS OF COMPARTMENTALISATION

Philosophies which form the basis of the reductionist-mechanistic world view date back to the views of Galileo, Descartes and Francis Bacon (Stevenson 1987). These philosophies are based on the assumption that there is external reality which is independent of the subject's mind and which is knowable (Piaget and Inhelder 1969). The main contributory factors to the development of this world view according to Stevenson (1987), have been:

- (i) Galileo's philosophy of the separation of the intellect from values, which has been the forerunner of the dominance of the analytical mind over the part of the human mind given to creativity and wholeness
- (ii) Descartes's basis of epistemology which emphasises the radical separation of self from object. This laid the foundations for a compartmentalised curriculum, a separation between scientific knowledge and values, as well as the belief in pure objective thought and perception uninfluenced by the biases of tradition, culture and language
- (iii) Francis Bacon's proposed union between knowledge and power, which presented science as a means of controlling and perfecting nature for human ends. This unity of knowledge and power was to be experienced through new forms of scientific knowledge which not only liberated the scientific and modern thinker from earlier ethical constraints against manipulating and changing the natural environment, but also held out the promise of building nature to serve mankind.

These three developments laid the foundations of the dominant curriculum paradigm which operates in many parts of the world (including South Africa) and which has come to be accepted without questioning. Knowledge (scientific and otherwise) came to be reduced, abstracted and grouped into disciplines which corresponded to "the nature of the mechanistic world" (Emery 1981, Gough 1989). This process began with the advent of the Industrial Revolution and the Age of Enlightenment (McKeon 1977, Harman 1985). Prior to the industrial revolution however, disciplines of medieval scholastic curriculum were conceived as practical arts rather than theoretical sciences. The medieval disciplines focused on the interrelationships between human moral purposes and personal and physical environments (McKeon, 1977). The goal of scholarship of these disciplines was "to perform works," rather than to discover or demonstrate some universal truth (McKeon 1977). The Aristotelian scholastic curriculum which dominated Europe until the eighteenth century, did not strongly distinguish between matters of fact and matters of value (Reid 1981). The idea of scientific detachment or any attempt to eliminate human values from supposedly "objective" world views was foreign to this scholarly tradition, regardless of whether one was studying nature, humans or the supernatural (Gough 1989).

It would appear that what seems to emerge as a new world view or curriculum paradigm is to some extent a revival of some of the Aristotelian conceptions of curriculum in which there was no strong distinction between matters of fact and matters of value (Reid 1981), in response to criticisms against the reductionistic-mechanistic world view and its attempts to separate feelings from thought, humans from nature and facts from values.

The solution to mechanistic and atomistic thought is to be found in new analogic thinking of Bateson (1972) informed by Gestalt psychology (Marx and Cronan-Hill 1985). Gestalt theory proposes that parts of a whole do not possess the same qualities as the whole, the whole is more than the sum of the parts. The "whole" must therefore be critically looked at before any solution to a problem is attempted. This has relevance for the emerging world view and holistic conceptualisation of environmental education (Marx and Cronan-Hill 1985).

Having examined the philosophical and epistemological basis of the reductionist-mechanistic world view, some of the criticisms that have been levelled against it, influence and effects on curriculum and the environment, it is time to turn to the new and emerging paradigm which has been proposed by various writers as an alternative to the reductionist-mechanistic world view and compartmentalisation. This emerging world view, emphasises whole-system perspective, ecological consciousness, human subjectivity and spirituality (Harman 1985). Aspects of this new paradigm have become embodied in what has come to be known as environmental education.

AN INTERDISCIPLINARY APPROACH TO ENVIRONMENTAL EDUCATION AS AN ALTERNATIVE CURRICULUM PARADIGM — THE NATURE OF THE EMERGING WORLDVIEW

Since the beginning of the second half of this century, there has been a search for educational philosophies and approaches to curriculum which would address the shortcomings of the dominant reductionist-mechanistic world view (Capra 1983, Robottom 1987, Daly and Cobb 1989, Orr 1990). This has been with the view to addressing, inter alia, the global environmental problems which threaten mankind. These problems are viewed by Capra (1983) as systematic problems, i.e. interconnected and interdependent. Capra therefore proposes that environmental problems cannot be understood and solved within the fragmented approaches and methodologies

characteristic of academic disciplines. Such approaches and methodologies, he believes, will merely shift mankind's difficulties around in a complex web of social and ecological relations. A solution can be found only if the structure of the web itself is changed, and this will involve a profound transformation of our social institutions, values, philosophies and curriculum frameworks. Several writers seem to agree with this position (Bateson 1972, Greig *et al.* 1987, Harman 1988, Gough 1989, Orr 1990, Gough 1991).

Harman (1985) describes the new world view, as a shift in paradigm characterised by whole-system perspective, ecological consciousness, feminism, transmaterialist spirituality, cultural pluralism, decentralisation of decision making, human scale technology and solidarity with developing countries. The value systems-perspective which characterises the new and emerging world view seems to be captured in environmentalism and environmental education.

THE EMERGENCE OF ENVIRONMENTALISM AND ENVIRONMENTAL EDUCATION

The Second World War brought devastation and hardships *inter alia* through the unleashing of the destructive powers of science and technology. This event led to a decline in the firm confidence that people had in the "wisdom" of scientific methods and approaches. The war gave rise to the Existential Movement in France which sought to challenge the dominance of scientific thinking and methods and to re-establish human values, individual thought and spirituality. However, the launching of the Sputnik in 1957 sped up a race for economic, technological and military supremacy amongst nations of Europe, America and the then Soviet Union (House 1979), contributing to massive ecological devastation in many parts of the world. Then the tide started turning. The publication of works like Rachel Carson's "Silent Spring" cited in Weale 1992, brought warnings of imminent ecological disaster to the world, and the emergence of ecological groups such as Jonathan Porritt's "Friends of the Earth" and "Zero Population Growth" indicated growing concern for the global environment in the 1960's (Stapp 1974).

The 1980's saw a period of unprecedented environmental concern reflected in the publication of various major reports on the state of the earth. These included:

- The World Conservation Strategy (IUCN 1980)
- The Global 2000 Report to the President (US Interagency Committee 1980)
- Sinking Ark (Myers 1980)
- Environment, Ideology and Policy (Sandbach 1980)
- Environment: From Surplus to Scarcity (Schnaiberg 1980)
- Whither Environmentalism (Mitchell 1980)
- The Emerging Ecological Paradigm in Social Sciences (Dunlap 1980)
- Our Common Future (The Brundlandt Report - World Commission on Environment and Development, 1987)

These thought-provoking reports barred the seriousness of the state of the global environment and the need to urgently tackle the issues. In this regard, the educational systems of the Western world in particular and the world in general were looked to as principal channels for influencing changes in the behaviour of present and future generations (Allen and Jones 1990). The important role education could play in dealing with these global environmental concerns was recognised at two major world gatherings on environmental education:

- The Belgrade Conference in 1975 (UNEP 1977)
- The Tbilisi Intergovernmental Conference on Environmental Education in 1977 - which resulted in the Tbilisi Principles of Environmental Education (UNESCO-UNEP 1978). These guiding principles would lay the foundations of environmental education as it is known today. (See Appendix 7).

The various attempts in the past at educating people about the environment had taken various forms and had been referred to in various ways. For example Greig *et al.* (1987) coined the expression "educating whole people for a whole planet". Underlying this global perspective of education was a perspective based on a holistic as opposed to an atomistic world view. The instructional philosophy was aimed at transforming the individual from homocentric and anti-ecological to an ecocentric being (Greig *et al.* 1987). Holism and ecocentrism are aspects which "global education" have in common with environmental education.

Hicks (1988) proposed "Education for Peace" in reaction to the destructive use to which scientific knowledge was put, particularly during the Second World War and the subsequent 'power race' amongst nations. Peace education focused on the peaceful

application of scientific knowledge and included skills of critical thinking, co-operation, empathy, assertiveness, conflict resolution and political literacy. Like environmental education, peace education did not suggest a new subject to be included in the school curriculum but rather an approach to teaching, in which the teacher's role was to create a person-centred learning climate which encouraged participatory and experiential learning and democracy. In this respect, Education for Peace seemed to be closely related to modern approaches to environmental education.

Another attempt at educating people about the environment was the School Camp Movements in Australia (Reid 1980, Strom 1980). In Britain environmental education started as Rural Study Programmes (Wheeler 1975). In the United State of America, it began as nature study with the publication of Wilbur Jackman's Nature Study Schools (Stapp 1974). It has been argued by Robottom (1985) that nature study and the subsequent emergent conservation and rural camp movements had modest educational and environmental goals. It has also been suggested that the social and political characters of nature study and conservative movements educating about the environment reflected traditional values that dominated Western industrial societies (Robottom 1985), and failed to challenge the philosophies underlying education, knowledge and the socio-economic and political fabric of society (Stevenson 1987). That is, nature study and conversation (education) were seen as embedded in a reductionist-mechanistic world view. In contrast, other approaches to environmental education reflect an emerging new world view, elements of which can be found in the IUCN definition of environmental education as well as in the recommendations on environmental education emanating from the Tbilisi Conference. Based on the definition and on the Tbilisi principles, the following has been proposed:

- Environmental education should be interdisciplinary
- Environmental education should involve problem solving
- Environmental education should impart critical thinking skills
- Environmental education should be community orientated and that learners must be involved in community projects.
- Environmental education should be aimed at attitude change and values clarification
- Environmental education should be aimed at participant involvement in the planning of learning experiences.

(Malcolm 1989)

It is, however, to be noted that the proposed principles of and approaches to environmental education form the basis of a great deal of debate amongst environmental educators.

INTERNATIONAL DEBATE ON APPROACHES TO ENVIRONMENTAL EDUCATION

International authors have varying opinions on the guiding principles of and approaches to environmental education, proposed by international bodies.

Musonda (1982) endorsed the Tbilisi guideline that environmental education should not be a new subject when he suggested that in essence when one speaks of environmental education, one is not proposing a new subject but rather underscoring topics which cut across all disciplines. Brennan (1991) agreed with environmental education being included within school subjects when he declared "I call for a programme of education which would involve all disciplines at all levels of education, be interdisciplinary in its approach and conceptual in its structure" (p.1). This view is also held by UNESCO-UNEP (1985b). Fensham (1977), Steinle (1980), Hurry (1981), Martin (1982), Orr (1990) have all suggested the inclusion of environmental education in school subjects such as Geography, Biology, English, Social Studies.

These views have attracted criticisms from writers like Vulliamy (1987), O'Riordan (1981), Robottom (1987) and Gough (1990). These writers have argued that defining (including) environmental education within the current dominant compartmentalised curriculum framework which operates in many parts of the world (including South Africa) defeats the purpose of environmental education which is aimed at interdisciplinarity and whole system-perspective.

The researcher supports the views of the above writers on the following grounds: Firstly, if one agrees with the views of Whitehead (1967), Bateson (1972), Capra (1983), Daly and Cobb (1989), Orr (1990) and Gough (1991), that the environmental crisis facing mankind is as a result of, *inter alia*, the narrow frameworks, compartmentalisation and the high levels of abstraction of the reductionist-mechanistic world view, (which also results in our inability to solve these problems), then one could argue that the mere inclusion of environmental education into subject disciplines as proposed by Musonda (1982) and Brennan (1991), is a rather too simplistic and

shortsighted view because it fails to take into account, the fundamental and incompatible differences between subject disciplines and environmental education. As argued by Capra (1983) and others, compartmentalisation is one of the fundamental problems in education which environmental education seeks to address; hence the interdisciplinary approach to environmental education proposed by international agencies. Furthermore, writers who suggest the inclusion of environmental education into school subjects such as Biology, Chemistry, Physics and Geography seem to have lost sight of the philosophical and epistemological underpinnings of subject disciplines, pointed out by Piaget and Inhelder (1969), Gibson (1979), and Emery (1981). The philosophical and epistemological foundations of these disciplines still remain reductionistic and mechanistic. The researcher would argue that these are incompatible with interdisciplinarity, whole-system perspective and the creation of ecological consciousness (Emery 1981, Gough 1989). The researcher therefore agrees with Gough (1990) that:

Just as green consumerism raises questions about what constitutes friendly production and consumption so an emphasis upon environmental issues within the sciences and geography in the curriculum raises questions about what constitutes environmental friendly schooling [education] (Gough 1990 p.144).

There has also been references to discrepancies and contradictions in the principles and approaches of environmental education. Robottom (1987) and Gough (1990) have urged caution over the use of centralised policies, as proposed at Belgrade and Tbilisi, as instruments of educational change. In their view, there is a need for a critical examination of the proposals put forward at the Tbilisi conference to ascertain whether the proposed policies can be suitably translated into classroom practice. Childness (1978), Robottom (1982) and Volk *et al.* (1984) have noted, for example, that problem solving and action orientation goals associated with environmental education are not adhered to. Instead, there is an over emphasis on the acquisition of environmental knowledge and awareness in school programmes. O’Riordan (1981) has also noted a discrepancy between the ideals of environmental education and the reality of practice revealed by research in various parts of the world: He concludes:

From the standpoint of both teacher and student the late twentieth century breed of environmentalism can plunge one into the very depth of despair and personal agony, devastating in its niggling exposure to contradictions between what ought to be done and what is done (p.3).

In an Australian study, the Education Department of Victoria found, in a postal survey, that contrary to generally accepted principles, environmental education, was found to be "fragmented and without direction" (Linke 1974). This was in sharp contrast to the Tbilisi guidelines that environmental education should be integrated and interdisciplinary (UNESCO/UNEP 1988). Gough (1989) also points out that:

Environmental education preaches an holistic perspective but still presents itself as a separate entity and preserves the teaching practices and learning experiences that go with a fragmented world view (p. 233).

He continues:

...there is a strong resemblance of environmental education to conventional science education in being dominated by the authority of teachers, textbooks and timetables and by the trivial pursuits of memorising information and performing routine technical skills (p.233-234).

Similar observations have been made in South Africa. For example, Hurry (1981) has observed similar discrepancies in the implementation of environmental education in secondary schools in South Africa eg: that even though environmental education is supposedly holistic in conception, in practice it involved little or no co-operation between Geography and Biology, even on common ground topics.

UNESCO (1977), observed the following discrepancies about the interdisciplinary nature of environmental education:

At school level, environmental education poses significant curriculum and teaching problems for practitioners: it aspires to be interdisciplinary, but the school curriculum is strongly disciplinary; it entails outdoor education but school rules and regulations impose constraints on out of classroom activities; it is a form of enquiry teaching but structures and relationships in schools tend to reproduce monodidactic forms of instruction; it is interested in enquiries that are critical involving critiques of environmental situations, but schooling tends to be more interested in vocational and liberal education (p.22).

At the same UNESCO conference, the following observations were made with regard to problems with the implementation of environmental education in schools:

- Rigid timetables rule out the possibility of any interaction between teachers in the different disciplines and allow pupils little time to take part in exercises aimed at solving specific problems affecting the life of the community.

- The traditional method of assessment of scholastic performance is considered inappropriate to the task of assessing personal development in environmental education.
- The notion of school as a self contained entity isolated from society exacerbates the difficulties of developing a community orientation in environmental education.

In the light of these well-documented contradictions and discrepancies observed in several countries, research into the practice of environmental education is clearly necessary.

NEED FOR RESEARCH INTO THE PRACTICE OF ENVIRONMENTAL EDUCATION

Even though the criticisms, comments and observations regarding discrepancies between the ideal and the practice of environmental education might be situation specific, there nonetheless seems to be a degree of generalisability about them even when applied to the situation in South Africa and Bophuthatswana. In a document proposing the incorporation of environmental education in the teacher education curricular of Bophuthatswana (Irwin 1981), the following proposals were made on the implementation of environmental education:

- (1) There is a need to identify all areas within the teacher education curriculum where environmental education might be relevantly included (p.2)
- (2) Environmental education is fundamentally cross-curricular in approach (p.2)
- (3) While the principles and theory of environmental education might be taught as a discrete entity, in practical terms it is not a separate subject but an integral part of most if not all other subjects in teacher education curricular (p.3)
- (4) It is ideally a link between subjects and thus the key to a holistic rather than a fragmented view of both knowledge and mankind (p.3)
- (5) The practical implementation of environmental education is not merely the conveyance of a body of facts, but rather an approach to teaching with emphasis on attitudes (p.3)
- (6) Teachers should thus be taught to teach environmental education within the school curriculum (p.3)

In the light internationally observed discrepancies between the ideal and the practice, the question arises as to whether environmental educators in Bophuthatswana actually implement environmental education within the school or colleges as proposed by Irwin (1981). If not, how is environmental education implemented in schools and colleges? Another question arises in relation to item (4) above: Does environmental education in schools or colleges serve as a link between subjects and thus serve as a key to developing a holistic rather than a fragmented world view? In the view of this researcher, these are pertinent questions which need to be investigated. As has been observed by Parry (1985):

There is a need for research in the field of environmental education that might reveal the detailed information about how schools and teachers [in this case colleges and lecturers] actually develop and implement an environmental education curriculum. This is with the view to make for better and informed planning.

As was noted earlier, Nevo (1983) advised that one cannot be engaged in an educational enterprise without undertaking an evaluation of the immediate and long term effects of the educational process. A 1977 UNESCO conference also emphasised the need for research and evaluation to provide useful guidelines for realigning approaches to the preparation of education and training programmes and for improving teaching materials. Schwab (1970) suggested:

If one wants to decide and to act with greater understanding in a particular curriculum situation, one should develop insight by interacting with the situation which consists of teachers, learners, subject matter and milieu (p.176).

This might be seen as an advocacy for participant based research, which has the advantage of insights which the outside researcher may not have.

On the strength of such observations, the researcher (who is a participant in implementing environmental education at college level), is undertaking this study into the practice of environmental education in Bophuthatswana colleges of education to ascertain:

- (1) The understanding of college lecturers of the interdisciplinary nature of environmental education and related terms such as cross-curriculum, integration, and multidisciplinary

- (2) The problems environmental educators face (if any) with the possible conflict between an interdisciplinary environmental education curriculum on the one hand and subject-based disciplines on the other
- (3) How they deal with such problems.

Before proceeding to deal with the above issues, there is a need to examine the development of environmental education in Bophuthatswana and South Africa. Geographically and in other ways, Bophuthatswana is an integral part of South Africa. There is, for example, a close link between the South African based Environmental Association of Southern Africa (EEASA) and the development and implementation of environmental education programmes in Bophuthatswana.

ENVIRONMENTAL EDUCATION IN SOUTH AFRICA AND BOPHUTHATSWANA

Environmental education in the sense in which people know it today reached South Africa in the early 1970's. It has been noted by Irwin (1990) that prior to this, efforts had been concentrated very largely on educating about soil erosion and nature conservation in what was termed, until the late seventies, "conservation education" (Irwin, 1990). Conservation education in South Africa, like its early counterparts elsewhere in the world (Reid, 1980; Wheeler, 1975; Stapp, 1974), concerned itself with wise use of natural resources and basic ecology. The political and philosophical aspects of conservation education were seldom addressed. This had to change with the advent of environmental education. Irwin (1990) has noted however that conservation education continues to constitute a significant and integral part of environmental education in South Africa, but it is clearly only a part of it.

Until 1980, outdoor education was also equated with environmental education in South Africa. Irwin (1990) has noted that the two ideas overlap to some extent, but are addressed by entirely different philosophical perspectives. He notes that some educational conservatives in South Africa were alarmed by the connotations of environmental education and therefore saw a possibility of sanitizing its sociopolitical dimensions by conflating it with outdoor education which was perceived to be free of such notions — other than those which were acceptably patriotic.

In 1982 the first International Conference on Environmental Education was held in South Africa. It was this conference that gave birth to the formation of the Environmental Education Association of Southern Africa (EEASA) which eventually played a catalytic role in the development and coordination of environmental education in Southern Africa (Irwin 1990). It is however to be noted that the first formal seminar on environmental education was held at the University of Bophuthatswana in October 1981 (Irwin 1993). Not long after this environmental education was introduced as a component of Development Studies at Unibo. It was after the conference that the seeds of environmental education were sewn in Bophuthatswana which is a 'National State' established in 1976 within South Africa. With regard to the state of development of environmental education in the 'National States', Irwin (1990) has observed that

"it is in the "national states", "homelands" and "black" areas of South Africa that environmental education has been most successful at grassroots level."
(p.5)

This is a testimony to the relatively high degree of success of environmental education in Bophuthatswana and other "black" areas of South Africa.

The establishment of BNPB, and the collaborative work with the Department of Education, has led to the laying of a firm foundation for the development of environmental education in Bophuthatswana (Irwin 1993). Other complementary educational activities are carried out by The Mobile Film Unit (Irwin 1993) and the Lengau Conservation Clubs of Bophuthatswana (Leketi 1991).

Presently environmental education is growing strongly in Bophuthatswana in the sense that the number of teacher education institutions which offer environmental education has grown from five in 1986 to eight in 1993. Some of the colleges offer environmental education as a major course for teachers who intend to teach environmental education in schools. The activities of the BNPB are being broadened with the view to bringing environmental education and awareness to as broad a spectrum of the citizens of Bophuthatswana as possible.

It is the aim of this research to explore the practice of environmental education in colleges of education in Bophuthatswana. According to the Tbilisi Conference of 1977, formal education, particularly teacher education, is expected to play a major role in bringing to fruition the aims of environmental education. I will therefore turn to the literature on the research methodology by which this research is to be conducted.

ILLUMINATIVE EVALUATION AS AN APPROACH TO THIS STUDY

There are various evaluation models, each of which is suited for a particular purpose of study. In the case of this study, the researcher choose an illuminative approach because it fitted in perfectly with the main aim of the researcher which was to throw some light on the practice of environmental education in colleges of education in Bophuthatswana. There are however a number of other models the most widely known and perhaps also widely used is the Tylerian model used to determine the extent of the outcomes of the achievements of educational objectives (Tyler 1950). This model in the view of the researcher is too limited in its application for it to be useful in this study. There is a utilitarian model proposed by Cronbach (1963), Alkin (1969) and Stufflebeam *et al.* (1971) which is aimed at providing information for decision making. Provus (1971) originated a model for the purpose of comparing educational performance with determined goals. Scriven (1967) and Glass (1969) developed a model for the assessment of merit or worth. All these models of evaluation are, in the opinion of the researcher, too restrictive in their application. This group of models have been known in the evaluation literature as traditional evaluation models; they tend to be based on the "agricultural — botany" paradigm (Parlett and Hamilton 1972). This paradigm relies on a hypothetico-deductive methodology derived from the experimental and mental testing traditions in psychology.

Parlett and Hamilton (1972) have identified the following shortcoming of the traditional evaluation models:

- It is difficult to control all relevant variables
- The evaluation is done after the programme has been implemented no a wide scale
- The study may be limited by insistence on collecting quantifiable data thereby neglecting valuable subjective data..
- The research design cannot accommodate changes which take place during the evaluation so new ideas may not be implemented for fear of spoiling the experiment
- The experimental method may not be sensitive to local or unusual conditions
- It is costly of time and resources
- The experimental method cannot always be applied to real-life situations.

Since 1976, several other models of evaluation have been conceived outside the so-called agricultural-botany framework. They relate instead to social anthropology and participant observation in sociology. Such models can be seen as representing a contrasting paradigm with a research style and methodology fundamentally different from that of mainstream educational research (Parlett and Hamilton 1976).

The British Humanities Curriculum Development Project developed by Stenhouse in 1971, and its evaluation, called into question the traditional relationship between the educator and the evaluator (Potter 1991). Parlett and Hamilton (1972) as a result proposed a new model of evaluation which they termed "illuminative". It is based on the assumption that programme evaluation involves a complexity of influences and realities and that the task of the evaluator should be to highlight or illuminate aspects of this complexity. The evaluator's role is interpretive rather than hypothetico-deductive or analytical.

Even though this new model of evaluation suit the aim of this study best, it nonetheless has shortcomings. For example one can neither be critical of the research finding nor be able to deduce or generalise from his/her study when an illuminative approach is used.

However as has been by Parlett and Hamilton (1972), there are very strong arguments in favour of illuminative evaluation in that it is less restricting than traditional models of evaluation. Other advantages they point out are:

- Illuminative evaluation examines the situational influences on a curriculum and the opinions and judgements of those involved in curriculum implementation a
- It discerns and discusses significant features of a curriculum, and the critical processes involved in implementing it.
- It identifies all the desirable elements of the curriculum.

Further advantages of the illuminative model (Parlett and Hamilton 1972) are the variety of techniques that can be used by the evaluator and the fact that the evaluator does not manipulate the system s/he is studying, but that s/he accepts it. They advocate that:

The role of the evaluator is to provide comprehensive understanding of the complex reality (or realities) surrounding the project: in short to "illuminate". The evaluator's report should therefore sharpen discussion, disentangle complexities, isolate the significant from the trivial and raise the sophistication of debate.

Having presented an overview of the nature of illuminative evaluation, it is the opinion of the researcher that its non-restrictive nature, coupled with the advantages of varied techniques, non-nonetheless, the understanding of reality in its complexity, and the creation of debate as features the main goals of this research could not be better pursued in this study. The methodological details of this study are to be explored in the next chapter.

CHAPTER 3

METHODOLOGY

PARADIGMATIC FRAMEWORK

Research paradigms determine criteria according to which one selects and defines problems for inquiry (Husen 1988). Two main research paradigms have been identified by Husen (1988). The positivist research tradition or paradigm which is characterised by the natural science model of research, and the interpretive research paradigm. In positivist research, the researcher makes (usually quantifiable) observations in order to establish causal relationships between isolated variables, in order to explain and predict. For the positivist researcher, there exists a mind-independent reality "out there" that is to some extent knowable; disciplined observation of it provides the epistemic foundations (Walker and Evers 1988).

The interpretivist paradigm has been derived from the humanities. Its emphasis is on holistic and qualitative information and the task usually is to interpret rather than explain and predict. Interpretive researchers believe that our theories shape our reality, as opposed to being objectively derived from that reality, and that there is simply no mind-independent or theory-independent reality. Interpretive researchers claim that the distinctive human dimension of education cannot be adequately captured by statistical generalisations and causal laws. It is argued that knowledge of human affairs is non-reducible and that the research inquiry must grasp the meanings, the complexities of situations and uniqueness of events, and the individuality of persons (Walker and Evers 1988).

The interpretive paradigm underpins this study in which the researcher seeks to study environmental education practitioners in an education setting which is complex and cannot be reduced to law-like generalisations. The study is aimed at understanding the situation better by interpreting the findings and not to generalise from them.

RESEARCH METHOD (SURVEY)

A survey research method was used for this study. Survey research in education involves the collection of information from members of a group, students, teachers or

other persons associated with the educational process, and the analysis and interpretation of this information to illuminate important educational issues (Rosier 1980). The survey method makes it possible for the researcher to interview all the environmental educators in colleges of education in Bophuthatswana in order to get as complete a picture as possible of the situation being studied.

Rosier (1980) has identified two main categories that surveys fall into:

- (1) To obtain descriptive information about a group and occasionally the entire population
- (2) To examine relationships between various factors, typically seeking to explain differences between students and some criteria, in terms of a range of explanatory factors i.e. analysis of data for causal relations.

In accordance with the chosen (interpretive) paradigm, this study encompasses the first category.

RESEARCH SAMPLE

There are 21 lecturers involved in the teaching of environmental education programmes in eight colleges of education in Bophuthatswana. Seventeen were interviewed. The following table is a summary of the number of environmental education lecturers in the various colleges.

Table 3.1: Number of environmental education lecturers in the eight colleges of education in Bophuthatswana

NAME OF COLLEGE	NO. OF LECTURERS
HEBRON COLLEGE OF EDUCATION	2
LEHURUTSE COLLEGE OF EDUCATION	2
MANKWE CHRISTIAN COLLEGE	2
MARAPYANE COLLEGE OF EDUCATION	4
MORETELE COLLEGE OF EDUCATION	3
STRYDOM COLLEGE OF EDUCATION	2
TAUNG COLLEGE OF EDUCATION	2
TLHABANE COLLEGE OF EDUCATION	4
TOTAL NUMBER	21

Of the total of seventeen lecturers interviewed, seven were involved with teaching environmental education at first year level in the primary diploma levels at the various colleges. Eight of the lecturers taught the course at a first year level in the secondary diploma levels. At second year level, four lecturers taught the course in primary diploma streams while another four taught it in the secondary diploma streams. At final year level (third year), there were two lecturers who taught the course at primary diploma level while another three taught it at secondary diploma level. In most cases, one lecturer taught the course across the streams (i.e. primary and secondary) and across year levels (i.e. first year plus second year and/or third year). The researcher found that this was almost invariably the case in all the colleges.

Two lecturers from Marapyane College and one from Hebron College declined to take part in the study because of time constraints. These three and the researcher, were the only lecturers left out of the sample.

Lecturers' levels of experience

There were few colleges which offered the course at third year level. Three of the colleges (Taung, Mankwe and Lehurutse) included environmental education in their college curriculum only at the beginning of 1993. In the case of Taung College, environmental education was part of the college curriculum in 1976, but was discontinued in 1990 and reintroduced in 1993. The reason given by some of the interviewees was that there was no lecturer who was prepared to teach the course after the first incumbent left the college to further his studies. It was further gathered from discussions that lecturers who teach environmental education at some of the colleges did not stay on for any considerable length of time (See Table 3.2). Lecturers would usually teach the course for a year or two and abandon it. The reason, based on the researcher's experience and the views of six interviewees, was that lecturers who are newly appointed to colleges are usually the ones assigned the duty of teaching environmental education (in situations where there are no lecturers to teach the course), to make up for a shortfall in their work loads and to take care of a course which few, if any, lecturers are actually qualified to teach. Lecturers who had been engaged in teaching environmental education in previous years would then usually shift to their main fields of study (as and when the opportunity presented itself) which they claimed "they were much more comfortable with" (pers. comm.).

It would seem that those lecturers were uncomfortable because the majority (eleven out of seventeen interviewed) had had no training in or exposure to environmental education. Table 3.1 summarises the levels of training among environmental educators in the colleges, as established during the research interview (Appendix 1a, Question 4).

Table 3.2: Summary of responses to the question: Did you have any training in environmental education? (Q.4).

YES	2
NO	11
YES, BUT ONLY AS PART OF A COURSE OR AN ELECTIVE	4

Table 3.2 clearly indicates the lack of formal training in environmental education among lecturers who teach environmental education at colleges of education in Bophuthatswana.

Two of the seventeen lecturers interviewed had obtained degrees in environmental education or environmental science from the United States of America. Four had studied environmental education either as part of their degree programmes or as an elective at university level. The study will show that this situation would have an effect on how successfully or otherwise environmental education would be implemented.

The researcher also sought to establish the levels of experience among environmental educators in the colleges (Appendix 1a, Question 3). Table 3.3 is a summary of the findings.

Table 3.3: Summary of responses to the question: How long have you been teaching/lecturing in environmental education? (Q.3).

0 - 1 YEAR	9
1 - 2 YEARS	3
2 - 3 YEARS	3
3 - 4 YEARS	2

Nine of the respondents were teaching the course for the first time in 1993. Three interviewees had been teaching the course for more than one year. Three other lecturers had been teaching the course for between two and three years. Only two of the lecturers had been teaching the course for more than three years and they were in their fourth year of doing so.

These findings support the observation made earlier that lecturers in some of the colleges did not continue teaching environmental education for long. Given the fact that environmental education was introduced into colleges of education in Bophuthatswana in 1986 (i.e. 9 years at the time of this study), it is clear that there has not been much continuity on the part of lecturers in teaching the course. This observation prompted the researcher to probe interviewees on the issue and the following emerged as possible reasons for the lack of continuity.

- (i) Lecturers who were qualified and knowledgeable in environmental education left the colleges in pursuance of more lucrative employment opportunities in other government departments and private organisations.
- (ii) The policy of the Department of Education of seconding environmental education teachers and lecturers to the BNPB, drained the colleges of qualified and competent environmental education personnel.
- (iii) Lecturers tended to abandon the teaching of environmental education after a couple of years in order to focus on their fields of specialisation.
- (iv) In some colleges, the status of environmental education was perceived as so low that lecturers did not want to take up the teaching of environmental education. In a few of the colleges, environmental education is major course but in the majority of the colleges, it is an ancillary course. In one college environmental education was offered as just an enrichment course with stipulated periods per week drastically reduced.

DATA COLLECTION TECHNIQUES

The main data collection technique used in this study was the semi-structured interview (Burroughs 1975, Kidder and Judd 1986, Rosier 1988). These included informal discussions of matters which arose during the interview, to clarify issues. The semi-structured interview was used because:

- (i) it enabled the researcher to be focused and remain focused about the issues that were to be probed into (by using an interview schedule);

- (ii) it accorded the researcher and interviewees the flexibility of discussing and digressing at some length without losing track of the core issues of the research. This enabled the researcher to gain deeper insights into the responses offered by the interviewees;
- (iii) it gave the respondents an opportunity to glance through the interview schedule before the interview began. This made the respondents feel more confident by gaining insight into the questions they were to respond to, and gave them the opportunity to think about their responses;
- (iv) other than would have been the case with a questionnaire, it gave the researcher the opportunity of making valuable human contacts and insights which he had not envisaged before the interview.

A minor data collection technique was participant observation (McKernan 1991), while the researcher attended a workshop organised by the BNPB at Pilanesberg National Park from 20 to 22 October 1993 (Appendix 4 and 5). The workshop was for environmental educators from all eight colleges of education in Bophuthatswana. The theme of the workshop was environmental education approaches, need analysis and evaluation of first year environmental education syllabi. This workshop was an opportunity for the researcher to collect relevant additional information on the research topic.

THE RESEARCH INTERVIEW

Interviews were arranged with college lecturers on an individual basis. An interview schedule (Appendix 1^A) was developed by the researcher for that purpose with two main objectives in mind:

- (i) To explore lecturers' perceptions or understanding of the interdisciplinary nature of environmental education and related terms.
- (ii) To ascertain problems (if any) experienced by college lecturers in the implementation of an interdisciplinary environmental education curriculum and to find out how they dealt with such problems.

An initial pilot run, to test the interview schedule and to practice interview techniques was conducted with five lecturers from Tlhabane College of Education. Two of the lecturers involved in the piloting were not environmental education lecturers, but their views were sought on clarity of questions, length of the questionnaire, sequencing of questioning and on the techniques used by the researcher in conducting the pilot interview. The five lecturers involved in the piloting were asked to fill in a short piloting questionnaire (in Appendix 1^B). Based on their responses, the following changes were made to the interview schedule:

- (i) Some of the questions were reformulated for clarity
- (ii) Two of the original questions were dropped because they were found to be irrelevant as far as the goals of the research were concerned
- (iii) The schedule had to be retyped to make it more attractive
- (iv) Extra copies of interview schedule had to be made for respondents who would require them for their own future reference.

Prior arrangements were made for personal appointments with college authorities (i.e. Rectors and Vice-Rectors, Heads of Departments) in order to gain entry into the colleges and access to lecturers. This was done at least a day before the interview to inform prospective respondents about the nature and purpose of the study, as well as to get to know them beforehand.

A pre-interview encounter with prospective respondents gave them the opportunity to ask questions and to engage in informal discussions which served as an 'ice breaker'. The time, place and conditions of the interview were then decided by the interviewees to suit their work schedule. With the exception of two lecturers who preferred to write down their own responses to the interview schedule, in the presence of the researcher, all the other responses from the interviewees were recorded by the researcher on spaces that had been provided on the interview schedule sheets for that purpose. The recording of interviewees' responses took place during the interview. The two lecturers who offered to record their own responses indicated that they could 'think better' when they wrote. After the interview, all interview responses were transcribed (Appendixes 2^A and 2^B) and coded in such a way that results could be presented confidentially. The researcher also kept notes on the informal discussions he had with interviewees.

With the exception of the two noted incidents in which the prospective respondents declined to be interviewed, the researcher found the respondents to be extremely co-operative and very enthusiastic about the study. Some of them pointed out that the exercise gave them an opportunity to rethink some issues in environmental education which they had taken for granted before. The respondents gave their time, ideas, suggestions and insights freely and willingly and wished to be informed about the outcome of the study.

DATA ANALYSIS

Data analysis involved qualitative and quantitative descriptions of the interview responses (Workshop and Duschl 1990). Interview responses were transcribed and categorised in accordance with the sequence in which questions were asked in the interview schedule or according to how the responses

related. A system of coding which enabled the researcher to identify the college, the order in which respondents from the colleges were interviewed as well as the total number of respondents from the college was used by the researcher. For the purpose of confidentiality, however, this coding system is not outlined in this study.

Discussion and observation from two workshops attended at the Pilanesberg National Park during the course of this study (Appendix 5 and 6) were included in the discussions and analysis of data.

CHAPTER 4

RESULTS AND DISCUSSION: THE CONCEPTS

INTRODUCTION

In this chapter, responses to interview questions relating to participating lecturers' understanding of concepts in, principles of and approaches to environmental education are described and discussed. It also examines the results on lecturers' understanding of terms related to the nature of environmental education. The chapter will cover responses to questions 5 to 10 (Appendix 2^A), in two main sections. These sections are:

- (i) Lecturers' familiarity with internationally accepted principles of and approaches to environmental education
- (ii) Lecturers' understanding of terms used to describe the interdisciplinary nature of environmental education

LECTURERS' FAMILIARITY WITH INTERNATIONALLY ACCEPTED PRINCIPLES OF AND APPROACHES TO ENVIRONMENTAL EDUCATION

In order to investigate how familiar respondents were with international concepts and principles which inform the teaching of environmental education, the following question was put to them:

How familiar are you with internationally accepted principles of EE? (By principles I mean key aspects which inform the teaching of environmental education.)

Responses to the question are summarised in Table 5.1. The actual interview responses are provided in Appendix 2^A Q.5.

Table 4.1: Summary of responses to the question: How familiar are you with internationally accepted principles of EE? (Q.5)

FAMILIAR	9
MOST FAMILIAR	4
LEAST FAMILIAR	3
NOT SURE	1

From the responses given by the respondents and upon further probing, the researcher formed the following opinions about the responses given:

- (i) Respondents who answered "quite familiar" to the question seemed to be most familiar with internationally accepted principles of environmental education.
- (ii) Those lecturers who responded by saying "to some extent" or "to a certain extent" or "not familiar" were found to be least familiar with the principles of environmental education.
- (iii) Those who provided answers which in the opinion of the researcher had no bearing on the principles of environmental education were placed in the "not sure" category to denote that the respondents were not sure of the question or of their responses. (Ref. Appendix 2^A, Q.5).

From the responses listed in full in Appendix 2^A, it will be noted that four of the respondents showed some understanding of the guiding principles of environmental education as found in the Tbilisi document. This finding is encouraging given the fact that it is these principles on which the teaching of environmental education is generally accepted to be based.

Nine of the interviewees had indicated that they were familiar with the Tbilisi principles of environmental education. Three of the nine admitted they did not fully understand everything that was contained in the document but that they understood most of it. A common principle spontaneously cited as an unclear aspect from the document was the "interdisciplinary nature" of environmental education. Six out of the nine lecturers said they did not understand or know how to deal with interdisciplinarity in teaching of environmental education.

Three of the lecturers showed very little knowledge of the Tbilisi principles (or any other generally accepted principle) of environmental education. They could only vaguely recall bits and pieces of

some of the principles. None of them could recall one of the principles completely, nor could they adequately explain what those principles meant.

It is significant to note that 9 of the 17 interviewees had indicated that they were familiar with the Tbilisi principles of environmental education. However five of the respondents showed little or no knowledge of the question put to them. This finding could indicate that about 30% of the respondents have very limited understanding of the concept and probably are not equipped to implement environmental education from an interdisciplinary perspective.

In order to ascertain whether respondents could recall some of the guiding principles of environmental education, the following question was put to them:

Can you mention some of the principles of environmental education which you regard as important?

Table 4.2 summarises the responses, while Appendix 2^A Q.6 gives more detail.

Table 4.2: Summary of responses to the question: Can you mention some of the principles of environmental education which you regard as important? (Q.6)

EE as a life long process	8
EE to involve problem solving (practical)	6
EE to be interdisciplinary	6
EE to be taught in its totality (holistic)	5
EE to teach interdependence of man and his environment (ecology)	3
EE to entail community involvement	3
EE to involve skill development	2
EE to teach awareness of the environment	2
EE to be formal as well as non-formal	2
EE to address quality of life	1
EE to teach protection of endangered species (conservation)	1
I do not know	1

Table 4.2 indicates that environmental education as a life long process was the principle that most of the respondents could recall. This is the second Tbilisi principle. Eight of the interviewees had mentioned this principle of environmental education, amongst other ones. For example one of the respondents had answered:

The Tbilisi declaration: that of EE being a life long process of education, both formal and non-formal.....(A1/1/1).

Another said:

EE should begin at childhood and should continue through adulthood i.e. a life long process. (G7/2/2)

The researcher noted that the respondents were very knowledgeable about this aspect of the Tbilisi principles.

Six of the respondents in their responses made references to the fact that environmental education entails problem solving. This is embodied in both the ninth and eleventh Tbilisi principles. (UNESCO-UNEP 1978b). Respondents demonstrated a clear understanding of the problem solving dimension of environmental education. One of them said:

..... it should also aim at alleviating the problems which might arise as a result of the interaction of man and his environment. (H8/3/2)

Six of the interviewees recalled the interdisciplinary nature of environmental education eg. "EE should be interdisciplinary in its approach" (E5/3/3). The notion that environmental education should be interdisciplinary is embodied in the third Tbilisi principle (UNESCO - UNEP 1978). The researcher noted that this principle was particularly difficult for the respondents to explain. However, there were indications of some limited understanding of it eg.(respondent C3/3/2 Appendix 2^A). Interdisciplinarity is an issue which this study intends to focus on and explore further.

Five of the interviewees referred to the notion that environmental education should aim at "*the totality of the environment*". This, the researcher interpreted to mean a holistic approach to environmental education. They in fact referred to the notion of environmental education being "holistic" eg. "*EE should be taught holistically i.e. the environment should be seen in its totality*" (E5/3/2). A holistic approach to environmental education is highlighted in the third Tbilisi principle.

Three of the interviewees referred to the interdependence of man and his environment as a principle of environmental education. The researcher would like to note that even though the 12-point Tbilisi principles do not specifically mention the interdependence of man and his environment, some goals of environmental education do emphasise the need for environmental education to foster understanding and awareness of the relationship of man and his environment (UNESCO-UNEP 1978 p.3). Therefore this response can be considered relevant to environmental education although does not really refer to a principle. The respondent had said:

EE should enhance the understanding of interrelatedness or interrelationship between man and his environment (H8/3/2).

The notion that environmental education entails community activities and involvement by learners was cited by three of the interviewees in response to this question. Community involvement is an aspect of the ninth Tbilisi principle. One of the respondents who referred to it said:

EE should be practical i.e. learners should use knowledge to improve on their immediate environment as well as their community (G7/2/2).

The development of skills for problem solving was mentioned by two of the respondents as a principle of environmental education. Developing skills to solve problems of the environment is embodied in the ninth and eleventh Tbilisi principles. To quote one of them:

EE should be action orientated. It should include community involvement. It should teach skills to solve problems. It should be a life long process (F6/2/2).

Two respondents answered the question by saying that environmental education should be taught through formal and non-formal educational processes. This is embodied in the second Tbilisi principle.

One respondent mentioned that environmental education entails the improvement of quality of the life. Amongst other things he said:

.....It (EE) is about quality of life (G7/2/2).

Even though a focus on "quality of life" may be seen as a principle, it is not mentioned in the Tbilisi principles, it is implied and actually stated in many of the internationally developed aims and objectives of environmental education. However, this response is deemed a less appropriate response to the question.

A similar inappropriate response, also focusing on what environmental education might be about, was the mention made of the protection of endangered species, by one respondent as a principle of environmental education. He said:

The protection of endangered species — Nature Conservation (D4/2/2).

Conservation can be seen as an objective of environmental education. It is, however, not a principle which informs the teaching of environmental education. The protection of endangered species and the conservation of resources in general, are goals which environmental education hopes to achieve.

Only one of the interviewees did not know what the principles of environmental education were. It was her first year of teaching environmental education, and at the time she was interviewed, she had been teaching environmental education for only four months.

Apart from this one respondent who claimed a complete ignorance on the topic, the majority of the respondents showed some understanding of some of the principles which inform the teaching of environmental education. Even though many of the respondents did not recall in detail any of the 12 Tbilisi principles, the level of awareness of various principles was encouraging. It was interesting to note however that certain Tbilisi principles were not mentioned by any of the interviewees. For example, no mention was made of the principles that environmental education should:

- examine major environmental issues from local, national, regional and international points of view
- focus on current and potential environmental situations
- promote values necessary for national and international co-operation
- explicitly consider environmental aspects in plans for development and growth
- help learners to discover symptoms and real causes of environmental problems
- emphasise the complexity of environmental problems
- utilise diverse learning environments and a broad array of educational approaches

It was not clear whether the respondents did not refer to these principles because they did not know them to be or that they did not find them important, or whether the ones they mentioned were simply the easiest to remember. It stands out from the responses given by the interviewees though, that the principles of environmental education:

- being a lifelong process
- being interdisciplinary
- being practical and oriented to problem-solving

were the most often cited. It would seem that the other aspects of the guiding principles are "silent" issues while the four most cited principles seemed to be of common knowledge amongst the interviewees. This does not however suggest that those "silent" principles are not important to the respondents as the framing of the question might probably suggest.

In order to determine whether college lecturers thought these principles and approaches of environmental education were different from those of subject disciplines taught at colleges of education in Bophuthatswana, the following question was put to them:

Do you think there is a significant difference from approaches used in other subject disciplines?

Table 4.3 summarises the responses, while Appendix 2^A Q.7 gives more detail.

Table 4.3: Summary of responses to the question: Do you think there is a significant difference between approaches used in other subject disciplines? (Q.7)

Yes	13
No	2
It depends	1
Not much	1

From the above table, it will be noticed that 13 of the 17 interviewees were of the opinion that there was a significant difference between principles and approaches of environmental education and those of subject disciplines. Eight of the 13 were of the view that the major perceived difference was that environmental education was not a subject, while subject disciplines were compartmentalised. Three respondents supported the notion that subject disciplines were aimed at memorisation and acquisition of knowledge [amongst others] for the sake of getting a job while environmental education focused mainly on attitude change. This was how one of the respondents described the difference:

Yes, there is a significant difference between EE approaches and that of other subject disciplines. Knowledge in other disciplines is required just for the purpose of doing specific tasks in a job. But in EE, people are subjected to corrective measures. It touches everybody's life (A1/1/1).

Out of the eight respondents saw the difference in terms of the compartmentalised nature of subject-based disciplines, one of them said:

In other subject disciplines, compartmentalisation is the key. There seems to be no relationship with other subjects. But EE relates to every other subject at least in principle. (E5/3/3)

Another respondent seemed to express the same view when he declared:

Yes, EE is not a subject. Other subject disciplines depend mainly on knowledge in the subject area. EE depends on all other subjects. (G7/2/2)

Two of the respondents did not think there was any significant difference between environmental education principles and approaches and those of subject disciplines. One of them was of the view that environmental education was studied within the framework of a subject like Geography, and that the approaches of Geography are similar to environmental education. He stated:

There is no difference. This is because environmental education is also studied within the framework of Geography, which is disciplinary. EE seems to be a tapestry of subject disciplines. (D4/2/1)

In the view of the researcher this perception seems to verify the claims made by critics like Robottom and Gough that defining the place of environmental education within a compartmentalised subject discipline like Geography makes environmental education to be compartmentalised as well. However there is a sense in which the respondent's response could be viewed as rather superficial in that it fails to take into account the philosophical and epistemological underpinnings which inform the principles and approaches of environmental education as opposed to Geography.

The next section of the study deals with the interdisciplinary nature of environmental education which is the main focus of this study. Before the responses of interviewees are discussed, a brief introduction to interdisciplinarity and some of the pertinent issues relating to it will be outlined.

LECTURERS' UNDERSTANDING OF TERMS USED TO DESCRIBE THE NATURE OF ENVIRONMENTAL EDUCATION

Background on the concept of interdisciplinarity

As outlined in Chapter Two, an interdisciplinary approach to environmental education has been recommended at international conferences in Stockholm in 1972, Belgrade in 1975, Tbilisi (1977), Moscow (1987) and in Rio (1990), as well as in the South Africa White Paper on Environmental Education (Department of Environment Affairs 1989). Many writers like Brennan (date unknown), Maher (1986), Parry (1986) and Ackerman (1989) have used the term in their writings on curriculum issues relating to environmental education.

The Tbilisi Declaration of 1977 published guidelines to environmental education, stating that environmental education should:

...be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective (UNESCO-UNEP 1978 p.3)

This approach has been defined as:

Teaching in which two or more disciplines are expressed in terms of a relationship (UNESCO-UNEP 1985 p.8)

This definition seems to suggest a teaching process in which common areas between various subject disciplines are highlighted. The problems involved in getting a clear understanding of this term has been recognised by UNESCO-UNEP:

This definition is so general, however, given the multiplicity of approaches to the problem, that leaves many questions unanswered (1985 p.8).

Generally the term interdisciplinary means found in a number of disciplines, usually two (Maher 1986); the prefix "inter" meaning "between". An example of the use of the term interdisciplinary to describe a particular curriculum approach is:

A case in point is the theme of kites suggested in a monograph on interdisciplinary education in the middle school. The unit revolving around this theme would have science students learn about the aerodynamics of flight, social studies students inquire into the history and social significance of kite flying, English students compare lofty poetry, mathematics students estimate altitude and so on (Ackerman 1989 p.27).

In the opinion of the researcher, it is doubtful whether the whole-system perspective which environmental education advances will be achieved through this perspective of interdisciplinarity. In Ackerman's example, it would seem that the different subject disciplines would have different perspectives of the kite. There is no indication that those different perspectives will become forged at any stage into a complete and coherent perspective which, in the view of the researcher is what environmental education calls for. Environmental education should enable the individual to see all the multifarious aspects of a "kite" in a coherent whole, not just from the separate perspectives of different subject disciplines. With that in mind further responses to the interdisciplinary will be explored.

Results pertaining to the term interdisciplinary

In order to further explore interviewees' understanding of the interdisciplinary nature of environmental education (the main focus of this study), the following question was put to them:

Several international documents recommend that EE should be approached from an interdisciplinary perspective. What is your understanding of the term interdisciplinary ?.

Table 4.4 summarises the responses, while Appendix 2^A Q.8 gives more detail.

Table 4.4: Summary of responses to the question: What is your understanding of the term interdisciplinary? Words/expressions used by the respondents: (Q.8)

EE should have/be	a bearing on related to relationship with	other subjects	5
EE should use knowledge and information from other disciplines			4
Teaching EE within/through (the medium of) other subjects			4
EE as an approach rather than a subject			2
Interface of various disciplines			1
Cutting across many subjects			1
I do not know			1

Respondents were of the opinion that an interdisciplinary approach to environmental education meant environmental education should have "a bearing on" other subjects (2), "be related to" other subjects (2) or "have a relationship with" other subjects (1). One of the respondents expressed the following view:

It means EE should not be taught as a discrete subject. It should be related to other disciplines. (E5/3/3)

Four respondents said they understood the interdisciplinary approach to environmental education to mean that environmental education should use knowledge and information from other disciplines. For example:

.....specific topics and skills related to other disciplines should be incorporated in EE e.g. atmospheric pollution in Geography also in EE and so is Ozone depletion etc. Some disciplines are more related to EE than others. (D4/2/2)

Another respondent said:

This refers to the idea that the information applicable to one subject discipline can also be used in another discipline i.e. using knowledge from Biology, Geography, History etc. (H8/3/1)

Four interviewees had used the words "within", "through", "in" and "medium" to describe their understanding of the relationship between environmental education and subject disciplines. One of them said:

This means EE should be taught within all the subjects in an educational institution. (G7/2/2)

Another stated:

It means EE should be taught through other subjects. (F6/2/1)

Another respondent viewed it as follows:

This means the teaching of EE concepts in other disciplines. EE should not be compartmentalised like other subjects. It should not be a subject on its own. (E5/3/1)

The fourth respondent had this to say:

It means cross-curricular. That is teaching EE in the medium of other subject disciplines. (A1/1/1)

Two of the interviewees indicated that they understood the interdisciplinary approach of environmental education as just an approach to teaching. One of them said:

It is an approach or perspective in which traditional subjects should be used to achieve environmental education objectives. Subject disciplines used as a vehicle by which EE objectives are achieved. (H8/3/2)

The other respondent had this viewpoint:

Interdisciplinary means that EE should be an approach to teaching i.e. teaching about environmental quality. (G7/2/1)

In the view of the researcher, this respondent does not explain what interdisciplinarity is, s/he merely suggests that it is an approach to teaching.

The final views belong to a category in which the respondents suggest environmental education "having a bearing on" or "relating to" subject disciplines. The respondents explained that this meant environment education had to cut across many subject disciplines. One interviewee said:

The main idea behind interdisciplinary approach is to reach as many people as possible. Hence it entails EE cutting across as many subject disciplines as possible so that the main objectives are attained. (C3/3/1)

The researcher views this response as very relevant given that, if environmental education were to be taught in every subject discipline as proposed by a number of international bodies, it has the potential of being studied by a large number of people. In fact it is one of the rationales of interdisciplinarity (See Tbilisi Declaration, UNESCO/UNEP 1978b).

The researcher notes that one of the respondents could not answer the question.

The views presented by the interviewees showed varying degrees of understanding and insights into the internationally accepted principle that environmental education should be approached from an interdisciplinary perspective, some clearer some more limited. It is a matter of concern though that one of the lecturers interviewed had no idea what this principle of environmental education entailed. In the next section, the views of the interviewees will be matched against some of the generally accepted meanings ascribed to an interdisciplinary perspective.

In order to ascertain the extent to which lecturers' understanding of an interdisciplinary approach to environmental education corresponded to certain generally accepted meanings ascribed to interdisciplinary perspectives (UNESCO/UNEP 1985b), the following question was put to them:

Which of the following do you consider as describing the term interdisciplinary?
(Please give reasons.)

Table 4.5 summarises the responses, while Appendix 2^A Q.9 gives more detail.

Table 4.5: Summary of responses to the question: Which of the following do you consider as describing the term interdisciplinary? (Q.9)

Every subject discipline should incorporate EE	15
EE should draw on available knowledge and skills from other disciplines	9
EE should be used to link all other subjects	5
Every subject discipline should be centred on the environment	3
All subject lecturers should adopt an EE approach	3
A variety of methods should be used in teaching EE	1

It should be noted that a respondent may have chosen more than one of the above options in response to this question eg (as in (ii) and (iv) in Appendix 2^A).

Table 4.5 shows that 15 of the interviewees were of the view that an interdisciplinary approach to environmental education meant every subject discipline offered in schools and colleges should incorporate environmental education. Three of the respondents suggested that this could be done through "theme teaching" — an approach in which topics, issues or themes from the environment will be used in the teaching of subject disciplines e.g. English comprehension, History, or General Science. They explained that the lesson could focus on the use of passages or news articles on the world population or energy crisis to highlight the threats posed by these issues. Others proposed that a similar approach could be adopted in the teaching of Mathematics in which the students could be guided to calculate the area of land available to an individual in a crowded urban or rural area, and compare that figure to the ideal area of land required by an individual for optimal living. This, also they explained, could be useful in highlighting the problems of high population densities.

One of them noted:

Some subjects have components of EE but they are not clearly linked to the principles of EE. In subjects like English, Mathematics and Geography, this link can be forged by focusing on environmental issues. In Mathematics, learners could deal with figures in relation to the environment to give figures concrete meaning. This will ensure that figures in Mathematics are concretised and made

more meaningful to learners. This could be a way of incorporating EE into Mathematics. (C3/3/1)

This researcher finds the ideas expressed in this response to be very useful.

Another interviewee said:

In English for example thematic teaching can be used in the teaching of poetry. Geography relates to the environment. Therefore environmental problems can be dealt with in Geography. The methods to be used will differ from one subject area to the other. (A1/1/1)

Even though this response sounds like the previous one, it is unclear to the researcher how the use of thematic teaching in English poetry relates to an interdisciplinary approach to environmental education. Perhaps the significance of this finding is that it highlights the generally limited and at times incoherent views that people have of environmental education approaches and how they can be translated into meaningful classroom practice. It should be noted that a third of the respondents had expressed views similar to the above.

One respondent though was of a slightly different view. He was of the opinion that an interdisciplinary approach to environmental education would enable all learners to be knowledgeable in environmental education. This was how he put it:

EE in its present form does not benefit every student because it is an ancillary subject. Therefore if taught as part of every subject, all learners will benefit. There are environmental issues in every subject so these must be emphasised e.g. 1992 Special English Paper [SPEN] for first year college examination (E5/3/1) [Appendix 3].

The researcher finds the first part of this view difficult to accept in that, if every student at the colleges in Bophuthatswana does not benefit from the environmental education programmes run by the colleges at the time of this study, it is not because environmental education is an ancillary course. However the researcher agrees with the view that environmental issues can be highlighted in every subject.

Some of the responses to the question (Appendix 2^A) left the researcher in doubt what the respondents meant. For example:

The environment has to be used when grappling with different subject matter. (C3/3/3).

When asked to explain further what he meant, the respondent could not offer a clearer explanation.

Another respondent also gave a vague explanation as follows:

How the explained aspects is related to the quality and nature of the environment. (H8/3/3).

Again, the researcher could not obtain a clearer explanation of what the respondent meant by this. The foregoing reflect examples of ambiguities and a lack of clarity in the responses offered by the interviewees. While some of them were articulate in their responses (C3/3/2, F6/2/2; Appendix 2^A Q.8) others gave responses which were rather vague and incoherent.

While some of the interviewees thought an interdisciplinary approach meant drawing on the available knowledge and skills from subject disciplines, (nine of them), others viewed it as incorporating environmental education into other disciplines (15 of them). There was yet another group which perceived the interdisciplinary approach to environmental education as a link to all other subjects.

This result should however be seen in light of the observation that even internationally, there seems to be neither clarity nor agreement on what an interdisciplinary approach to environmental education is (UNESCO/UNEP 1985b). The term seems to be used to denote an aggregation of several perspectives. What seems to transpire from the use of the term in international literature though is that, interdisciplinary is taken to refer to a relationship between two subjects and not several; as most of the respondents in this study seem to suggest (Maher 1986).

Lecturers' understanding of other terms used to describe the nature of environmental education

As stated earlier, several other terms are used by authors to describe the same or nearly the same, the concept of interdisciplinarity (UNESCO-UNEP 1985 p.8). This section of the study aims to establish the understanding that interviewees have of these other related terms.

Results pertaining to the term multidisciplinary

In order to find out how lecturers understood the term multidisciplinary, the following question was put to them:

There are a number of other terms which are sometimes used to describe environmental education. How do you understand the following terms? Or how do you think each of these terms differs from the term "interdisciplinary"?

Table 4.6 summarises the responses, while Appendix 2^A Q.10 gives more details.

Table 4.6: Summary of responses to the question: There are a number of other terms which are sometimes used to describe EE. How do you understand the term multidisciplinary? (Q.10)

Inclusion of subjects into EE	9
Subjects must include EE	3
Knowledge and skills from several sources	1
I do not know	4

The term "multidisciplinary" has been used by Duigan *et al.* (1982), Parry (1985), Stevenson (1988) and Ackerman (1989). Ackerman (1989) used the term in the following example:

Now let us assume that some concepts have been identified that are considered important in two or more subjects. The question then arises: why should we stick them together in a multidisciplinary unit course? (p.27)

From this example, the researcher interprets multidisciplinary to mean the interplay of several subject disciplines (usually more than two) in informing teaching or learning in a coherent manner. From this perspective, incorporating environmental education into subjects disciplines, as nine interviewees posited (Table 4.6), would suggest the identification of important concepts, issues or information in various subjects, and dealing with them in a coherent manner to achieve environmental education aims.

One of respondent said:

The inclusion of several disciplines [subject disciplines that is] into EE (B2/2/1).

How this was to be done could not be properly explained by the respondent. The researcher notes that there does not seem to be much clarity on multidisciplinary even from international literature on the subject.

Another respondent said:

The inclusion of various disciplines within a particular discipline. (H8/3/2)

The difficulty the researcher had with these views was that the respondents referred to the "inclusion of disciplines" (not just drawing on relevant sources within the disciplines) to inform the teaching of environmental education. The researcher would like to point out that a subject or a discipline will embody a lot of information, materials as well as approaches which might be irrelevant to environmental education, hence the need to draw on (or identify) areas of relevance to environmental education as proposed by international bodies.

Three of the lecturers were of the opinion that a multidisciplinary approach to environmental education meant that subject disciplines must incorporate environmental education. It should be noted that there is a distinct difference between this view and the previous one. The previous view emphasised the inclusion of subjects (many of them) into environmental education. The latter view focused on many different subject disciplines embracing environmental education. One of the respondents put it this way:

The way in which EE can be studied in a variety of disciplines. (E5/3/3)

and another offered:

A variety of disciplines (subject disciplines) must emphasise the EE component in them. (E5/3/2)

One respondent's view was that the multidisciplinary approach to environmental education meant that knowledge, skills and resources from several disciplines had to be used in teaching environmental education. This was how he expressed his view:

This will refer to a situation in which information or material, knowledge used in EE can be derived from a variety of sources or subject disciplines. (H8/3/1)

In the opinion of this researcher, this view comes close to the one expressed by Ackerman (1989). The respondent was proposing that relevant aspects of a number of subject disciplines can be used to inform the teaching of environmental education in a multidisciplinary fashion. It should be noted also that there seems to be no marked difference from the responses given, between interdisciplinary and multidisciplinary.

Five of the respondents indicated that they neither knew what a multidisciplinary approach was, nor what the difference between interdisciplinary and multidisciplinary is. To some of them, the two terms seemed to mean the same but they could not precisely tell the similarity. This finding is important in that in the environmental education literature, several such terms are used by writers without a clear explanation of what they mean or how the terms differ if at all (UNESCO-UNEP 1985). Perhaps writers assume that the meaning of these terms are obvious, but when one tries to clarify them, one realises that there is absolute lack of clarity or at best limited understanding of what these terms mean. There seems to be a need for clarity on the use of terms such as interdisciplinary and multidisciplinary so as to enable environmental educators to ascribe a definitive meaning to them.

Having looked at multidisciplinary, lecturers' responses to the concept holistic, is the next to be explored.

Results pertaining to the term holistic

Lecturers were asked to explain what they understood by the concept/term "holistic" which is widely used in the environmental education literature.

Table 4.7 summarises the responses, while Appendix 2^A Q.10 gives details.

Table 4.7: Summary of responses to the question: ... How do you understand the term holistic? (Q.10)

EE should taught in its totality/entirety	7
EE should all embracing	3
EE should touch on every topic and discipline	3
EE should be treated as a whole	2
I do not know	2

The Tbilisi principles of environmental education states that environmental education should:

Be interdisciplinary in its approach, drawing on specific content of each discipline in making possible a HOLISTIC and balanced perspective. (UNESCO-UNEP 1978 p.4)

This has been interpreted to mean that environmental education must adopt a holistic outlook covering the ecological, social, cultural economic and other aspects of each issue (UNESCO/UNEP 1978). This means that environmental education should aim at viewing environmental issues from a broad perspective which include issues which might even seem remotely related to the environment eg economics politics and religion.

Stapp (1978), Hurry (1981) and Gough (1989) have used the term "holistic" in their writings. Hurry (1981), for example, has noted as follows:

Environmental education must be taught holistically. In theory environmental education deals with the total human environment. As far as possible therefore, learners should be encouraged to think of wholes rather than in parts (p.24)

He continued:

Holistic teaching encourages learners to consider all the important environmental factors affecting the element or elements they are studying. It also encourages the learner to look for inter-relationships between the elements they are studying and the rest of the environment (p.27)

It can be deduced from the above that the operative words or expressions are "wholeness", "totality", "broadness," "wider view" and "inter-relationship." Environmental education should be taught from a point of view in which the total environment (see first Tbilisi Principle, Appendix 7),

is the focus and not just part of it. The perspective that "the whole is more important than the sum of the parts" (Bateson 1972), in its broadest sense, should form the basis of the teaching of environmental education. A similar view was expressed by Irwin (1981) in his proposal on the incorporation of environmental education in teacher education curricular in Bophuthatswana:

It [environmental education] is ideally also a link between subjects and thus the key to a holistic rather than a fragmented view of both knowledge and mankind (p.3)

Seven of the respondents indicated that their understanding of the term "holistic" was that environmental education should be taught in its totality or entirety. By this they seemed to mean that every aspect of the environment should be considered in teaching in order to bring about a broad perspective. Two of the respondents stated:

To view the environment in its totality. Every aspect of knowledge that has a bearing on life and the environment. (C3/3/2)

and:

An approach which views EE in its entirety i.e. not dealing with specifics but dealing with general issues and knowledge. Nothing left out — every aspect to be considered. (E5/3/2)

Even though not very definitive these views are in general agreement with those expressed by some of the internationally renowned writers on environmental education cited earlier.

Three of the respondents felt that the term holistic referred to environmental education being taught from a broad inclusive perspective. For example:

Broad, all embracing, all incorporating (A1/1/1).

This view is also similar to some others expressed earlier.

Three respondents had suggested that holistic meant environmental education has to touch on every topic and discipline. The notion of "touching on every discipline" could be interpreted as similar to the view of Irwin (1981) when he pointed out that ideally environmental education should be a link between subjects. This was how one of the respondents put it:

EE should bring in other disciplines. (F6/2/1)

Another said:

EE should cover every topic. (F6/2/2)

In the opinion of the researcher, the respondent probably meant that every aspect (topic) of the environment should be covered in the teaching of environmental education.

Three of the interviewees equated the notion of environmental education being holistic with environmental issues being treated as a whole or in a manner which emphasised relationships. One of them noted:

Treating the subject [subject matter or content of environmental education] as a whole. From the beginning to the end e.g. soil erosion and how it is caused, how it contributes to famine, how it causes desertification, how it contributes to lowering of living standards etc. (D4/2/1)

The researcher notes that this view is not different from the one expressed by Hurry (1981).

Mention should be made of three other perspectives of holistic expressed by some of the interviewees. One of them viewed holistic as relating to the development of the total learner. eg. "Environmental education must affect the learner in his total aspect i.e. emotionally, physically and intellectually (H8/3/1). Another respondent was of the view that a holistic approach to environmental education means that it: "Should not ignore other segments of our society" C3/3/3). In the view of respondent (B2/2/1), unified knowledge and totality of the disciplines is his understanding of the term holistic.

Only two of the lecturers did not know what the term holistic meant.

From the responses given by the respondents, it can be concluded that they generally had a good understanding of what a holistic approach to environmental education is.

Results pertaining to the term integration

It is fairly widely accepted that environmental education is not to be introduced to educational programmes as a separate subject or discipline, but as a dimension to be integrated into them. Environmental education is a result of a "re-orientation" and "re-articulation" of the various disciplines and of various educational experiments (natural and social sciences), providing an INTEGRATED perception of the environment (UNESCO 1977).

A number of writers have also suggested that there should be an integrated approach to environmental education for example, Harod (1981), W'O Okot-Uma and Wereko Brobbly (1985) who proposed:

It is important that at the primary and secondary school levels of education the basics of the environment and concerns are instilled in the learner and more so in an INTEGRATIVE approach. (p.142)(emphasis added).

Newman (1981) has written extensively on the subject of integration of environmental education. He noted that there are areas in environmental education which overlap (have common ground) and proposed that such areas of "overlap" can, and should be consciously made to "play into" each other in a mutually beneficial way. He cited three particular streams (areas) of environmental education which overlap: Environmental Science, Environmental Studies and Environmental Engineering. He notes:

What this overlap means in practical terms is that an enormous amount of integration in knowledge appears to be an essential feature of environmental education.

This explanation by Harold in the view of the researcher, is another example of ambiguity and lack of clarity in the use of concepts in environmental education literature. The notion of integration as used by W'O Okot-Uma and Wereko Brobbey (1985) would seem to suggest that relevant disciplines and areas of study which inform the teaching of environmental education have to be tapped in to enrich environmental education. What Newman (1981) suggested on the other hand, seems to relate to integration within environmental education and not the integration of environmental education with other subject disciplines or other subjects with environmental education.

Other writers like Ackerman (1989) and Capra (1991) have written on the subject of integration in curriculum in general, not specifically on environmental education. They have expressed views which are unlike those of W'O Okot-Uma *et al.* (1985) and Newman (1981). Ackerman (1989), for example, has argued for the validity of curriculum integration on the grounds that the "whole is greater than the sum of its parts" (Bateson philosophy) and therefore suggested that an integrated curriculum may have "validity beyond disciplines". He pointed out:

Valid curriculum integration thus assembles a number of parts from different subjects with the hope that students will learn the parts better in the processes of exploring the inter-relationship amongst them. But an integrated curriculum generally has, besides the disciplinary parts, some organising centre or them or "hub" to which they are connected. (Ackerman 1989 p.29).

The researcher notes that the notion of inter-relationship as used in this instance is the same as in the case of holistic.

A 1979 UNESCO Regional Workshop on the Teaching of Environmental Education at Tertiary and Postgraduate Levels (UNESCO 1979) recognised the nature of environmental education curricular as being integrated when they declared that environmental graduates are "integrationists" as distinct from "generalists" or specialists. It has been noted by Newman (1981) that if we are going to be environmental educators who are to be able to deal with environmental issues, then a primary task must be the development of integrated knowledge.

In order to find out how lecturers of environmental education in colleges of education in Bophuthatswana understood an integrative approach to environmental education, they were asked to express their understanding of the term "integration" as an approach to environmental education.

Table 4.8 summarises the responses, while Appendix 2^A gives more detail.

Table 4.8: Summary of responses to the question: ...How do you understand the term integration? (Q.10)

incorporating mixing bringing linking parts of including introducing	(other subjects) INTO environmental education	12
I do not know		2
Teaching EE together with other subjects		1
Same as multidisciplinary		1
Development of "whole" human being		1

From the above table, it will be noted that 12 of the lecturers understood the term "integration" to mean a curriculum situation in which subject disciplines related to environmental education are incorporated into it. This view is similar to those some respondents expressed on interdisciplinary. Other related expressions which, in the opinion of the researcher conveyed approximately the same meaning as incorporating were "mixed into", "bringing into", "linking with", "included in".

One respondent noted:

Mixed with other subjects but not necessarily incorporating everything. (A1/1/1)

The interviewees's response seems to suggest that the notion of curriculum integration is that subject disciplines should be mixed into environmental education. That is, subject disciplines which have a bearing on environmental education, are to be fused with environmental education in a coherent and mutually beneficial way.

One respondent said an integrative approach to environmental education meant the teaching of environmental education together with other subjects. When pressed to explain further, the

respondent could not. Another respondent was of the view that an integrative approach to environmental education meant the same as a multidisciplinary approach. His response to multidisciplinary was as follows:

EE should not be confined to the approaches and methods of a particular subject discipline. (C3/3/2)

The researcher notes that this response is rather vague. When asked to explain further the respondent said a multidisciplinary approach to environmental education meant the use of different approaches of subject disciplines in the teaching of environmental education, and so is integration. He did not however indicate what the different approaches were. The researcher has difficulty with the view expressed by this respondent because as Newman (1981) has noted:

Integration does not mean multidisciplinary "fruit salad" courses which just highlight problems and show a multiplicity of individuals burrowing into their own little solutions. (p.114)

In the assessment of the researcher, the responses of interviewees regarding the term 'integration' were generally clear but some were however rather ambiguous. In a few cases, the explanations given could even be considered explicit (E5/3/3 and H8/3/1). The instances in which respondents did not exhibit a clear understanding in their responses, in the researcher's view, can again be attributed a lack of clarity even in the international literature on environmental education.

The views of lecturers on cross-curriculum approach to environmental education is the next to be explored.

RESULTS PERTAINING TO THE CONCEPT OF ENVIRONMENTAL EDUCATION ACROSS THE CURRICULUM

The view that environmental education is to be taught on a cross curricular basis has been pointed out by many writers. Irwin (1981 p.3) for example suggested that "... *environmental education is fundamentally cross-curricular in its approach*".

This, he explained, required the identification of areas within the teacher education curriculum where environmental education might be relevantly included. A similar view was expressed in the Tbilisi principles (UNESCO-UNEP 1978). Other writers like Richards (1982), Musonda (1986), Ben-Peretz (1978), and Gough (1991) have called for a cross-curricular approach to teaching environmental education, in which they proposed that every school subject should be used to teach about environmental issues. This view is similar to that expressed by interviewees on 'interdisciplinary', 'multidisciplinary' and 'integration.' The reason for such an approach has been that there are environmental dimensions in all human dealings and therefore it is necessary for

environmental education to be introduced in all subject disciplines. Brennan (1991) summed it up succinctly when he stated:

Although education for environmental awareness is a worthy goal, it is not purely a matter of syllabus, detaching educational provision from disciplinary frameworks and the rest. It is a matter of becoming aware that there is an environmental dimension in all our dealings.

A similar viewpoint was expressed by Stone (1990) when he stated in relation to the need to infuse environmental education into teacher education curricular:

Teacher education faculty should therefore attempt to infuse environmental education material into the existing framework of teacher education programmes. This calls for the inclusion of environmental education training across the curriculum in reading, maths, social studies and science.

The researcher interprets these views to mean that the notion of teaching environmental education across the curriculum is that of making use of school subjects as media through which to teach about environmental issues. In order to find out what lecturers of environmental education understood by the concept of teaching environmental education across the curriculum, a question was put to them to that effect and following responses (as in Appendix 2^A p.12 and summarised in Table 4.9) were obtained.

Table 4.9: Summary of responses to the question: ... How do you understand the concept of teaching EE across the curriculum?

EE to be taught in across every subject	8
I do not know	3
Every subject must relate to the environment	3
Teaching other subjects through EE	1
Same as transdisciplinary	1
It is learnt every time everywhere	1

Table 4.9 shows that eight of the interviewees indicated that their understanding of the concept of teaching environmental education across the curriculum was that environmental education should be taught in every school subject. That is, school subjects should be used as media through which environmental issues and topics are taught. One of them said:

EE to be taught in all the school subjects. This suggests that the curriculum will have to be structured to accommodate this structure [cross-curricular teaching] (E5/3/1).

Again the researcher notes that there does not seem to be a marked difference between this response and those earlier on expressed by respondents on interdisciplinary, multidisciplinary, and integration.

The researcher further notes that this view expressed by (E5/3/1) relates very closely to the views expressed by Irwin (1981) and Stone (1990).

Four of the lecturers indicated that they did not know or were not sure what was meant by teaching "environmental education across the curriculum". In the view of the researcher, this finding is of significance in the light of the fact that leading environmentalists are promoting a cross-curricular approach to environmental education eg. Irwin (1980).

One of the interviewees was of the opinion that teaching environmental education across the curriculum meant teaching other subjects through environmental education, but the example s/he gave suggested teaching environmental education through other subjects. Though not so well expressed, the view does have some merit in that the respondent was trying to suggest the use of environmental themes in subject areas such as English, to create environmental awareness. But that is not quite the same as teaching English through environmental education. The researcher is of the view that the respondent meant teaching environmental education through English as a subject by using environmental themes in comprehension passages as an example (Appendix 3). This was how the respondent put it:

Teaching other subjects through EE e.g. teaching English comprehension using passages which deal with environmental issues. (H8/3/1)

One respondent was of the view that teaching environmental education across the curriculum was similar to a transdisciplinary approach to environmental education. This is how he explained what he thought the term "transdisciplinary" meant:

Across subject disciplines i.e. a superimposition of EE over subjects such as Chemistry, Physics, etc. (H8/3/2)

It is to be noted that a similar view to that of the latter respondent, has been expressed by Orr (1990 See Chapter Two). The researcher interprets "superimposition" to mean over-arching, i.e. the respondent was of the opinion that environmental education aims should be the over-arching concern of subjects like Chemistry and Physics. It can be deduced that the respondent's understanding of the concept of environmental education across the curriculum would be to make environmental education objectives the paramount concern of all subjects within a school curriculum.

One response which the researcher considers quite interesting was the one offered by H8/3/2. S/He was of the view that cross-curricular was the same as transdisciplinary the only difference being that the latter is at "macro-level." This researcher finds this perspective interesting because the

respondent seems to categorise the two terms into a hierarchy which in the researcher's view, brings a refreshing dimensions of interpretation to the terms.

Apart from the response given by respondent (H8/3/3) which did not suggest the respondent understood the concept cross-curricular, the rest of the respondents seemed to show an appreciable degree of understanding even in the few cases in which the responses lacked clarity. Perhaps the view of one of the respondents sums it all up:

... No one of the terms above captures all the essential ingredients, intents and purposes of environmental education. A combination of these terms might give a proper picture of what environmental education should be about (E5/3/2).

Transdisciplinary is the term on which to seek respondents on in the next section of this study.

Results pertaining to the term transdisciplinary

Transdisciplinarity assumes conceptual unification between disciplines (UNESCO-UNEP 1985b p.8). The term has been used in environmental education literature by some writers to describe the nature of the curriculum framework of environmental education. Brennan (1991) used the term transdisciplinary when he stated:

We can perhaps break away from modes of education that draw only on one or two frameworks [interdisciplinarity] by providing transdisciplinary units and degree programmes which encourage multiframework [more than two] thinking. Examples of these include degree programmes in human ecology drawing upon the disciplines of various sciences as well as philosophy, politics and international law. (p.293)

Brennan (1991) seemed to call for programmes (at least at tertiary level) in which several frameworks, perspectives and disciplines are drawn upon to reflect the complexities of the human situation and thereby to equip the individual to deal with those complexities adequately. The call for a transdisciplinary approach to environmental education by some writers is therefore a call for environmental education to draw on the perspectives of several frameworks and disciplines such as Ethics, Law, Religion, Economics, Philosophy and Mathematics, in order for one to be able to address the complexities of environmental issues (Brennan 1991).

In order to ascertain lecturer's understanding of the term, a question was put to them to that effect. Their responses are given in full in Appendix 2^A (p.11.).

Table 4.10: Summary of responses to the question: ... How do you understand the term transdisciplinary?

EE cutting across other disciplines	9
EE linking other subjects	3
I do not know	2
From one discipline to the other	1
Different disciplines	1
Common to all disciplines	1

It will be noted from the table that none of the responses given by the respondents to this question matched the sense in which Brennan (1991) and UNESCO/UNEP (1985b) used the term. Nine of the respondents had indicated that the term meant environmental education "cutting across" other disciplines. This response is similar to those given earlier to explain terms such as "integration", "multidisciplinary" as well as "across curriculum". In the view of the researcher, the responses given by interviewees on transdisciplinarity reflect a lack of definitive clarity in the use of such terms in environmental education literature.

From the responses given by the interviewees it would appear that the terms they have responded to, mean the same or nearly the same. But in the researcher's view all these terms could not mean the same or nearly so. What seems to stand out clearly is that the apparent lack of clarity of these terms is because they seem to be used loosely and inter-changeably (UNESCO-UNEP 1985). To eliminate the confusion and uncertainty which such a situation creates as the findings of this study will attest to, there is a need for environmental educationists to clarify the use of such terms.

SUMMARY AND COMMENT

In the estimation of the researcher based on his review of the literature on the topics, interviewees generally showed a fair and appreciable understanding of the terms interdisciplinary, holistic and integration. However, there seemed to be a lack of clarity in respondents' understanding of the terms "across the curriculum", "transdisciplinary" and "multidisciplinary". Respondents often admitted to not knowing certain terms; in other cases, when they gave explanations, these were some times ambiguous and superficial.

It would seem the reason for interviewees generally limited understanding of these terms and concepts is because of the way the terms are used in environmental education literature as evidenced

by the texts referred to in this study. The use of terms like "multidisciplinary", "transdisciplinary" and "integration", even though they may have deeper and specific meanings, are not normally explained as such in the literature. Hence lecturers are prone to interpret them fairly superficially and ambiguously as no different from one another, or no different at all. Their interpretations might not always be in accordance with internationally held meanings as shown in this study. It therefore seems imperative that the use of these terms in environmental education be clarified, given that many of them are embodied in the very principles which should inform the teaching of environmental education.

In the opinion of the researcher, the difference between "interdisciplinary" and other terms like "multidisciplinary" and "transdisciplinary" would seem to be the degree to which there should be interpolation between environmental education and subject disciplines - interdisciplinary being of a lower degree of interpolation, while transdisciplinarity is of a higher degree than interdisciplinarity. (At least this is the impression one gets from the works of Irwin (1981), Robottom (1985), Parry (1985) and Gough (1990). The understanding that college lecturers have of these terms, it can be argued, are based on some of these readings. If, however, there are other levels of meaning (which the researcher acknowledges there might be), then such meanings should be clarified in the literature.

With regard to "integration" "cross-curriculum", the researcher is of the opinion that the difference is very slight. The concept "Holistic" seems to be well differentiated from the five terms mentioned before. This might explain why respondents did not find it difficult to explain. There seemed to be little ambiguity about this term, although there were variations in interpretations.

Having discussed lecturers' understanding of the various terms, related to interdisciplinary, it is now time to turn to how lecturers actually implement environmental education from an interdisciplinary perspective, and the problems which they face. In the light of the conceptual limitations exposed above, one might expect to find some problems regarding the practice of environmental education from an interdisciplinary perspective, in the colleges of education in Bophuthatswana.¹

¹The researcher has provided a limited view of his understanding of some of the terms used to describe the nature of environmental education on pages 43, 48 and 61. The researcher did not go to great lengths to define these terms because that was not the aim of this study. The study sought to highlight the lack of clarity and shared understanding of environmental education terms and concepts, even amongst environmental educators.

CHAPTER 5

RESULTS AND DISCUSSIONS: IMPLEMENTATION

INTRODUCTION:

This chapter analyses the way in which environmental education lecturers at colleges of education in Bophuthatswana go about the implementation of an interdisciplinary environmental education curriculum within a curriculum framework which is predominantly subject-discipline based. Problems which lecturers encounter in this regard and the solutions as they perceived them are explored. The aim is to ascertain the extent to which environmental educators are able to adhere to some of the principles of environmental education. This chapter covers responses to questions 11 - 22 of the interview schedule (Appendix 1^A). The responses are given in full in Appendix 2^B and are categorised as follows:

- Opinions on whether environmental education should be taught from an interdisciplinary perspective.
- Opinions on whether there is a difference perceived as significant, between an interdisciplinary approach and a subject-based disciplinary approach.
- Reported problems relating to the implementation of an interdisciplinary environmental education curriculum
- Suggested solutions to problems.
- Ratings of the success or otherwise of the implementation of environmental education in the colleges.

OPINIONS ON WHETHER ENVIRONMENTAL EDUCATION SHOULD BE TAUGHT FROM AN INTERDISCIPLINARY PERSPECTIVE

In order to ascertain whether lecturers were in agreement that environmental education should be taught from an interdisciplinary perspective, the following question (Appendix 1A, Q11) was put to them:

Do you agree with the opinion (principle) that EE should be taught from an interdisciplinary perspective?

Table 5.1 summarises the responses, while respondents' comments are listed in Appendix 2^B.

Table 5.1 : Summary of responses to the question:

Do you agree with the opinion that EE should be taught from an interdisciplinary perspective? (Q.11)

YES	15
YES (without comment)	10
YES (with comments)	4
NO	2
Did not answer	1

Fifteen of the 17 interviewees agreed that environmental education should be taught from an interdisciplinary perspective. Of the 15, only four could however comment further to justify their views (See Appendix 2^B). One of the respondents when pressed to justify his view, responded as follows:

It helps to improve comprehension of learners. It affords continuity, it helps to indicate that knowledge is holistic, that disciplines are meant to see knowledge only from a particular perspective. (B2/2/1)

The researcher would like to agree with the respondent on the notion that an interdisciplinary approach to teaching could enable students to perceive the interconnectedness of knowledge and issues, including those which affect the environment. The researcher agrees with the respondent's implied view that an interdisciplinary approach to teaching overcomes the limitation of subject disciplines which are based on narrow frameworks and compartmentalisation. The researcher questions however whether this leads to continuity and continuity of what kind? The researcher also questions how interdisciplinary teaching improves the comprehension of students. From his experience, the researcher would like to suggest that because learners seem to be set in the subject-discipline mould, they tend to find an interdisciplinary approach to teaching quite confusing.

One of the respondents agreed that environmental education should be taught from an interdisciplinary perspective on the grounds that it had the advantage of not adding extra work to the already "overloaded" college curriculum. He was of the opinion that if environmental education were to be introduced as a subject in schools and colleges, it would constitute a strain on the resources and capabilities of lecturers and teachers. He expressed this view as follows:

The basic reason will be that the school curriculum is overloaded. Hence no need to introduce a new subject (like environmental education). If EE were a subject, it would end up as any other subject and then its life giving mission

would be lost. EE will reach a broader population if it is taught across the curriculum (interdisciplinary). (H8/3/2)

This researcher would agree with this respondent to the extent that environmental education would reach a broader spectrum of the population if it were taught as part of every subject. However, the researcher cannot agree with the two other views expressed in the above quote.

Firstly, the argument that the curriculum of educational institutions in general is overloaded is untenable as far as this researcher is concerned. It is his view that as at the time of this study, there were a number of subjects which are not taught in educational institutions (in Bophuthatswana) which will need to be introduced at a future date as a matter of necessity to make learning even more comprehensively balanced and meaningful — subjects such as Music, Home Economics, Fine Art, Physical Education, Health Science, African Studies, Civics, Government, not to mention the myriad of technical, technological and vocational courses which are currently not in the curriculum of many educational institutions. This researcher would like to argue that there is a need for students to be exposed to as wide a variety of subject disciplines and learning experiences in order to make their education more meaningful. And as and when this does happen, it will become the responsibility of schools and colleges to shoulder this task. In the light of the perceived importance of environmental education to the survival of mankind and the global environment (Capra, 1983; Bennet, 1985; Lauder and Brown, 1988), the argument that educational institutions are too pre-occupied to be able to accommodate a 'new subject' because the curriculum is over loaded is a rather lame argument.

Secondly, the "life giving mission" of environmental education is not dependent on whether it is taught as a subject or not. The researcher interprets "life giving mission" here (see Appendix 2B) to mean the role of environmental education in saving the global environmental and all the life sustaining resources therein. This "life giving mission" of environmental education, in the view of the researcher, might be seen to stem from the philosophical and epistemological foundations of environmental education. Therefore, whether or not environmental education becomes a subject (and the researcher is not advocating that it should be), its aims and objectives will remain the same.

Two of the interviewees disagreed that environmental education should be taught from an interdisciplinary perspective but for different reasons. One of them suggested that because college lecturers are not trained in interdisciplinary approaches to teaching, lecturers might find the practice of it to be a problem. He said:

Lecturers must have a thorough knowledge of EE otherwise they tend to ignore environmental issues in their subject areas. (D4/2/2)

The researcher is of the opinion that this response has a lot of merit in it. If lecturers are to incorporate environmental topics in their subject areas but lack knowledge of those environmental topics which they are to incorporate, they are unlikely to touch on them. It will be a case of the individual feeling neither compelled nor competent to do what is expected of him or her. It should however be added that this is not to suggest that an interdisciplinary approach to environmental education is undesirable.

Whether or not respondents agreed that environmental education should be taught from an interdisciplinary perspective, the following question (Appendix 2B, Q.12) was put to them:

Do you find it possible to teach EE from an interdisciplinary perspective?

Table 5.2 summarises the responses.

Table 5.2 : Summary of responses to the question: Do you find it possible to teach EE from an interdisciplinary perspective? (Q.12)

YES	8
NO	8
No answer	1

Table 5.2 shows that eight of the respondents indicated that they found it possible to teach environmental education from an interdisciplinary perspective. When further asked to explain how they do this, one of the respondents said he would normally explain how issues such as Politics, Economics, population growth, atmospheric pollution and the depletion of the ozone layer were related to a subject such as Geography as well as environmental education. This was how he put it:

For example in Geography, one must explain how politics is related to environmental problems. (C3/3/3)

Another respondent indicated that depending on the subject area, an interdisciplinary approach could be achieved by a teacher or lecturer relating environmental issues to various subject areas. This was how he expressed his view:

It depends on the topic [subject] to a large extent. One tries to relate topics in one area to the other i.e. air pollution and how it is influenced by Chemistry, Home Economics or Bio-geography. (H8/3/1)

Other examples of how lecturers implement an interdisciplinary approach to teaching are listed in Appendix 2^B.

It is important to note that at least half of the lecturers interviewed indicated that they did not find it possible to teach environmental education from an interdisciplinary perspective. The reasons given by the respondents ranged from lack of knowledge of an interdisciplinary approach to the nature of the education department's policy regarding examinations (See Appendix 2^B). Some of the respondents were of the view that there was simply not enough time allocated to environmental education for this principle to be put into practice. One of the respondents observed:

There is no time for it and I am not trained in it. (F6/2/1)

Four of respondents echoed the above sentiment. For some of the respondents, the problem was with the policies and expectations of the education department. They were of the view that because lecturers have to account to the Department of Education for students who failed examinations, their whole focus and pre-occupation was on preparing the students to pass their examinations. Hence they would use the most effective method to achieve this end. They did not think interdisciplinary teaching was such a means. A reason commonly cited by respondents was that an interdisciplinary approach to teaching was time consuming and the lecturers did not seem to have much time to spare. One of the respondents had this to say:

To be honest I have not taught EE as such. Maybe the reason that the college system is examination orientated and lots of other things depend of this [examinations]. For example, lecturers have to give a written account of why students failed in their subjects. The people at the Curriculum Division will have to design a whole interdisciplinary curriculum for colleges in order for this to work properly. (C3/3/1)

Apart from the examination-orientated nature of the college curriculum, which many of the respondents saw as a major factor militating against the adoption of an interdisciplinary approach in their teaching, many also thought that unless there was a whole new curriculum, designed with an interdisciplinary approach to teaching as a focus, it was going to be difficult for this principle of environmental education to be realised.

The researcher agrees with this view to the extent that there is a need for a whole new curriculum design with approaches and perspectives which are interdisciplinary, to allow for the implementation of this principle. As things were at the time of this study, it was an uphill task for environmental education lecturers to pursue an interdisciplinary approach to teaching in isolation, while all the other components of the college curriculum pursued a different approach.

Other respondents were of the view that the environmental education syllabi (as were operational in Bophuthatswana colleges of education at the time of this study), did not seem to be interdisciplinary in nature. One of the respondents observed:

I do not use an interdisciplinary approach because college curriculum does not allow this to be done. Besides, the course [EE] itself seems to be discipline inclined. (G7/2/1)

The question of time was mentioned as a reason why the interdisciplinary approach was not being adopted. Some of the respondents were of the opinion that the time allocated for environmental education on college timetables was inadequate for a lecturer to indulge in interdisciplinary teaching. They were also of the opinion that this situation was compounded by the fact that many lecturers had little knowledge of what an interdisciplinary approach to environmental education was. One of the respondents noted:

There is not much chance [time] for a teacher [lecturer] to explore all the issues thoroughly. A teacher might not be knowledgeable enough in some aspect which relates to other subjects. (D4/2/2)

This remark is relevant if one views the idea of an interdisciplinary approach to teaching from the point of integrating knowledge and skills from some subject area into another. The question which arises is whether an individual has sufficient knowledge and skills in those other subject areas to enable him to draw on them relevantly and adequately. On the other hand, if one views interdisciplinary teaching from the point of showing relationships of an area of study to others, then the question of whether one has the knowledge and skills required to enable him to show those relationships effectively, comes into focus.

Be it as it may, it is significant to note that about 50% of the interviewees had pointed out that they did not find it possible to teach environmental education in accordance with one of the cardinal Tbilisi principles of environmental education.

Having explored respondents views on whether they found it possible to practise interdisciplinary teaching, their opinions on the differences between interdisciplinary and disciplinary teaching will be sought next.

OPINIONS ON WHETHER THERE IS A DIFFERENCE PERCEIVED AS SIGNIFICANT, BETWEEN AN INTERDISCIPLINARY APPROACH AND A SUBJECT-BASED DISCIPLINARY APPROACH

Having obtained the views of respondents on whether environmental education should be interdisciplinary, the researcher sought to find out whether the college lecturers perceived any difference between interdisciplinary teaching and disciplinary teaching. The question was:

Do you think a possible difference exists between a subject based curriculum and an interdisciplinary approach to EE as in colleges? If so, does this pose any problems?

Table 5.3 summarises the responses, while Appendix 2^B (Q.13) gives more detail.

Table 5.3 : Summary of responses to the question: Do you think a possible difference exists between a subject-based curriculum and an interdisciplinary approach to EE as in colleges? (Q13)

YES	12
NO	4
Does not answer the question	1

Table 5.3 shows that 12 of the respondents thought there were significant differences between an interdisciplinary approach to teaching environmental education and the approaches used by other subject disciplines. They also agreed that the differences posed problems to college lecturers as well as students in the implementation of environmental education. The following were cited by the respondents as some of the problems which they face in the implementation of an interdisciplinary environmental education programme:

- syllabi and college timetables are too structured and inflexible and no provisions are made for environmental education approaches.
- neither teachers nor lecturers are "trained" in interdisciplinary teaching
- resistance from colleagues and the fear of change to new approaches on the part of lecturers due to lack of knowledge about environmental education
- conflict between environmental education approaches and those of subjects disciplines
- inadequate time allocation for environmental education.

Some of the interviewees were of the opinion that the college curriculum generally was not flexible enough to accommodate environmental education and its interdisciplinary approaches. One of the respondents observed:

Yes, there is [a difference]. This might pose problems because it [environmental education] is not incorporated into the syllabus. The syllabuses are stiff, structured and compartmentalised. The Institute of Education and the Curriculum Planning Division of the Department of Education should take the initiative to change this. (A1/1/1)

Two of the respondents were of the opinion that even though an interdisciplinary approach to teaching would improve learning (a view the researcher does not share, as pointed out earlier, under the discussion of Question 11), the failure to make provisions on the college timetables to accommodate interdisciplinary teaching makes it "a waste of time". Another issue which was

frequently mentioned was that lecturers were not trained in interdisciplinary teaching. One of the interviewees had this observation to make:

There is a problem. There are no teachers [lecturers] who are trained or who are specialists in EE approaches. (D4/2/2)

This is a significant observation because the issue of teachers or lecturers not being adequately trained in interdisciplinary teaching of environmental education was one of the problem areas identified in 1977 by the UNESCO conference on the Interdisciplinary Nature of Environmental Education (UNESCO 1977).

Two of the interviewees had pointed out that they faced problems with some of their colleagues who consistently questioned them about environmental education and what it stood for. They suggested that perhaps some of their colleagues were apprehensive about what their colleagues described as "the aggressive and unorthodox nature" of environmental education and its approaches. For example:

Yes there is a problem. Subject based disciplines resist the innovative stance of environmental education. Unless the individual [subject based lecturer] has done a course in Geography. (E5/3/3)

In the experience of this researcher, this observation is valid. The problem can perhaps be attributed to the fact that subject lecturers have become so used to the conventional methods of teaching and have developed such confidence in to the extent that they fail to appreciate any other approaches. Furthermore, a lack of knowledge of what environmental education is meant to achieve, coupled with a general attitude of fear of change might contribute to this resistance from subject lecturers which respondent (E5/3/3) referred to. Some college lecturers perceived environmental education as being in conflict with established traditions of education. For example:

Yes indeed. To some lecturers, the introduction of environmental education (and its approaches) seem[s] to make their subjects to be overshadowed and old fashioned ... (H8/3/2)

Another respondent expressed a similar view:

Yes. There is a conflict, while courses at college are taught as disciplines and are highly regarded by students and lecturers, environmental education seem to be unclear and therefore students and some lecturers do not take it seriously. (G7/2/1)

This view is significant in that even though none of the respondents expressed it as such, there are indications from some responses to suggest that there was little clarity on interdisciplinary teaching of environmental education.

Also worth mentioning here is the issue of time allocation to environmental education on college timetables. Some interviewees noted that time constraints did not allow them to practise interdisciplinary teaching. For example:

.....There is not enough time for those environmental education approaches to be practised. (H8/3/2)

To the extent that factual knowledge is to be taught in environmental education, the three periods a week allocated to it are adequate. The researcher would however agree with the view that, the time allocated for environmental education is inadequate for a college lecturer to pursue the effective implementation of environmental education in accordance with internationally accepted principles of which an interdisciplinarity seems to be an essential dimension. Furthermore, the fact that lecturers are untrained in interdisciplinary teaching would suggest that they would require more time to experiment.

Only five of the interviewees did not think there was a difference between an interdisciplinary environmental education approach and the approaches of subject disciplines. Some were of the view that a Geography lecturer should not experience any problems with interdisciplinary teaching because Geography is closely related to environmental education. They did not, however, say whether the teaching of Geography was also interdisciplinary. One respondent said:

No, there is no problem because Geography is closely related to environmental education. But in the case of subjects which are not closely related to environmental education, the teacher might find it a problem. (D4/2/2)

Another observed:

No, there is no problem. Maybe it is a problem to non-environmental education lecturers, but not to those who teach environmental education. (E5/3/2)

The researcher would like to note that certain findings of this study do not support this view. Six of the 12 respondents who indicated that an interdisciplinary approach to environmental education does pose problems for them had degrees in Geography. One of the respondents (A1/1/1) who has a degree in environmental education from the United State of America also said s\he had problems with interdisciplinary teaching. Respondents D4/2/2 and E5/3/2 might not have problems with an interdisciplinary approach to teaching but that certainly was not the case with all Geography specialists who were involved with the implementation of environmental education in colleges of education in Bophuthatswana. Only one interviewee did not answer this question. .

To further explore the perceived problems which environmental educators face (or would face) with the implementation of an interdisciplinary curriculum (i.e. would-be teachers still at college or even teachers already in service), the following question was put to college lecturers:

Do you think that it (an interdisciplinary approach) poses problems to teachers in schools?

Table 5.4 summarises the responses, while Appendix 2^B gives more detail.

Table 5.4: Summary of responses to the question: "Do you think that it (an interdisciplinary approach) poses problems to teachers in schools?" (Q.14)

YES	14
NO	2
Does not answer the question	1

Of the 17 lecturers interviewed, 14 indicated that if college students (would-be teachers) were to implement an interdisciplinary environmental education curriculum at school level when they qualified as teachers, they were likely to face problems. Three of the lecturers pointed out that the students would not have had any training at college as to how to implement an interdisciplinary curriculum (See Appendix 2^B). This was what one of them had to say:

.... College students have just studied these things (interdisciplinary approaches) in theory — they have not had any practice. (H8/3/2)

Another respondent expressed a similar view when he argued as follows:

It sure will [pose problems], because they [the students] are to teach environmental education through other school subjects and yet they are not being taught to do this at college. (G7/2/2)

It is worth noting again that nine lecturers indicated that an interdisciplinary approach to environmental education posed problems to them in an earlier question. Some had indeed reported that they did not approach the implementation of environmental education from an interdisciplinary perspective, therefore it seemed unrealistic to expect that students would be able to do this at school level.

Other respondents were of the opinion that unless the education system and the structure of school curricular were changed to accommodate interdisciplinary approaches to teaching, it was unlikely that this will ever be practised by teachers. For example:

..... subject based curriculum is geared towards examinations. So there is a need for curriculum content and evaluation (of schooling) to be changed to accommodate interdisciplines [sic]. (E5/3/1)

and:

An interdisciplinary approach poses problems because it is not incorporated into the syllabuses (of schools). (A1/1/1)

One of the respondents expressed a different view when he noted that at school level, learners are too young to be able to grapple with an interdisciplinary curriculum. This respondent also mentioned time constraints as a mitigating factor. He said:

There will be a problem with schools because the learners are much younger. There is also not much time to accomplish this. (C3/3/2)

Only two of the lecturers who were interviewed did not think college students who later qualified as teachers would find problems implementing an interdisciplinary environmental education curriculum. One of them said:

No, not much of a problem because they [students] will be familiar with environmental education approaches. (E5/3/3)

This researcher would like to note that, in an answer to a question on whether an interdisciplinary approach to environmental education posed problems, the same respondent had answered:

Yes, there is a problem. Subject based disciplines resist the innovative stance of environmental education. Unless an individual had done a course in Geography. (E5/3/3)

There does not therefore seem to be correlation between the respondent's earlier answer and his later claim that an interdisciplinary curriculum would not pose a problem for college students who qualified as teachers and had to implement it.

In order to explore lecturers' view on students' perceptions of the interdisciplinary nature of environmental education, the following question was put to them:

What would you say is the perception of your students of the interdisciplinary nature of environmental education?

Three distinct categories of responses seemed to emerge from the answers given by the respondents. One group of 10 respondents were of the opinion that students found the idea fascinating because they could see that environmental education was related to subjects disciplines. One respondent said:

Students have come to realise that environmental education is related to other subject disciplines. They appreciate their involvement in environmental education. (D4/2/1)

A group of 3 lecturers seemed to suggest that students found it difficult to understand interdisciplinary teaching because their thinking was set in the dominant curriculum framework which is based on subject disciplines. One lecturer noted:

Their reaction is mixed. Some think it is interesting and challenging. Others think it is overburdening and difficult — they are set in the traditional mould.
(H8/3/2)

and:

Students are used to compartmentalised curriculum so they find it difficult to adjust to new approaches..... (B2/2/1)

Some lecturers (5 of them) felt that although students might express interest and excitement about environmental education and interdisciplinary teaching, they (the lecturers) were not quite sure whether the students had a clear understanding of what interdisciplinary teaching entailed. One of the respondents pointed out:

They think it is quite a wonderful idea but I am not sure they do quite understand what it is. (F6/2/1)

Another lecturer said it did not seem to be clear to his students what the notion of environmental education and interdisciplinary teaching was about. He explained that it was only the students' first semester at college and that they "were still trying to find their way". Another response was that students responded very favourably to the idea of interdisciplinarity, but found it "difficult to practice" (G7/2/1).

There were a few other responses which did not quite fit into the categories above. One lecturer pointed out that students from his college felt environmental education should be a subject on its own so that they (the would-be teachers) could teach it in schools.

Having sought the views of and responses to interdisciplinary teaching of environmental education, the next is to explore specific problems relating to the implementation of environmental education from an interdisciplinary perspective.

PROBLEMS RELATING TO THE IMPLEMENTATION OF ENVIRONMENTAL EDUCATION WITHIN THE COLLEGE CURRICULUM

In order to ascertain the kind of problems which lecturers are faced with in the implementation of an environmental education curriculum, the following question was put to them:

How does the way college is organised affect the implementation of EE in the colleges?

In response, 15 lecturers referred to time as their most serious problem. They referred to time in relation to the following:

- length of periods on the colleges' timetables
- number of periods allocated to environmental education
- distribution of periods on the college timetables
- the nature of the examination timetable.

Many of the lecturers were of the view that the three periods per week stipulated in the environmental education syllabi were inadequate. They claimed that this did not even allow them to complete the syllabus effectively. This was one respondent's observation:

Periods are few i.e. three periods a week. This affects the effective completion of the syllabus. Environmental education is more theoretical than practical.
(D4/2/2)

The researcher interprets this to mean that environmental education at some of the colleges was only done in theory because there was too little time allocated to the course to enable lecturers to engage in practical projects and other activities.

Respondent H8/3/2 seemed to express a similar opinion when she indicated that:

There is not much time on the timetable for students' participation in lessons, problem solving and community involvement.

Another said:

The time allocated for EE does not allow for its proper implementation. (H8/3/3)

In the experience of the researcher, these observations are valid only if one considers them in conjunction with other factors such as the frequent interruptions in the colleges. Such interruptions seem to affect environmental education periods to a much greater degree than the other courses taught at the colleges. This is because if two periods of environmental education were lost in a week to sporting activities, or to students' meetings or excursions, there was virtually no other period for the lecturer to make up for the lost time. Closely related to the problem of period allocation was the issue of period distribution. Some of the lecturers interviewed were of the opinion that compounding the problem of insufficient periods (three periods a week for environmental education compared to seven or nine periods for other college subjects), was the manner in which the periods were distributed on the timetable. Some of the respondents observed that a period of environmental

education which came directly before another subject did not allow the lecturer to undertake practical and outdoor activities, because students had to be ready to change over to the next lesson immediately after that period. One respondent suggested:

Periods are poorly allocated — EE periods should be the last periods of the college day so that the lecturer can extend it if he wishes to do practical work. Number of periods for EE are too few — i.e. three periods per week. Suggested number is seven periods a week. (B2/2/1)

Bureaucracy in the colleges was mentioned by two respondents as being problematic. They argued that it was very difficult for environmental educators to fulfil certain aspects of the environmental education syllabi e.g. field trips and excursions, practical projects and community activities, because one needed to go through many official channels for the necessary permission to do so. They noted that by the time a lecturer succeeded in getting through this bureaucratic red tapes, there was usually not sufficient time to carry out the programme or activity so intended.

....There is too much bureaucracy such that a lecturer finds it difficult to arrange for an outing or trip with students. Before one succeeds in negotiating, there will be no time left to undertake the trip (F6/2/1).

This observation is valid to a large extent. In the experience of the researcher the unco-operative attitude of 'educational bureaucrats' poses serious drawbacks to the successful implementation of environmental education. College administrators seem to be attached to the traditional teaching approaches involving such transmission methods of teaching as classroom demonstrations. They seem therefore to find it strange that environmental education lecturers want to go on field trips and excursions or engage in other forms of outdoor activities when they ought to be in their classrooms. Based on his interaction with college administrators, the researcher suspects that many of the educational bureaucrats are not conversant with the environmental education syllabi and therefore lack knowledge of what is entailed in environmental education.

Closely linked to the unsupportive attitude of 'educational bureaucrats' is the issue of the status of environmental education in some of the colleges. One respondent had noted that the status of environmental education as an ancillary subject, or, in the case of one college, as an enrichment course, had a negative impact on the implementation of environmental education. He noted that because environmental education was an ancillary course, some college administrators and lecturers tended to think that it was a less important course. Which explains why they do not understand that ample time should be spent on the course in the first place. Such an attitude would also seem to explain why in certain colleges, environmental education is taught once a week in three consecutive periods, because the other ancillary courses are better suited to this arrangement. This was the observation made by one interviewees:

EE is lumped together with other ancillary subjects e.g. Librarianship, Guidance and Counselling which require three periods running..... (E5/3/2)

In one college, the researcher was told that environmental education was not even an ancillary course, but that it was regarded as only an enrichment programme. For that reason only two periods per week had been allocated to it contrary to the departmental stipulation. The combination of these factors made it difficult for some of the lecturers to implement environmental education effectively. As one of the lecturers noted:

EE at this college is not even an ancillary course. It is termed as an enrichment course, so the status is low and students as a result do not regard it seriously. (C3/3/1)

It should be noted that the ancillary status of environmental education has changed in three of the colleges into a major course from the beginning of 1993. However, it is a matter of concern to note that environmental education has been reduced from a three-year course to a one-year course for those who still study it as an ancillary course. There are very few students who opt to major in environmental education, which is offered only to students pursuing courses in secondary education diplomas. This has the implication of making environmental education available to fewer and fewer students.

In eight of the responses given to the same question, the issue of the practical projects as a necessary component of environmental education was raised. The respondents were of the view that, if practical projects are an important aspect of environmental education, then it should be carried out in such a way that there was continuity, with a student starting a project in the first year and continuing to the third year. One respondent noted:

.....It would be more desirable if there was a practical component of EE. It would be best if this practical component was a continuous project which includes community work, tree planting, recycling, cleaning exercises, checking erosion, etc. (E5/3/2)

Other respondents observed that if there was a practical component to environmental education at college level, that component should also become examinable, to serve as motivation and incentive to the learners. At least five interviewees (pers. com.), expressed concern over the fact that environmental education was to be conceptualised as "hands-on", but the evaluation was based solely on written examinations. Suggestions were made in this regard, eg.

.....Outdoor projects should be evaluated and made part of semester evaluation. (A1/1/1)

and:

.....*Evaluations should be based on practical work as well.* (H8/3/1)

One respondent went so far as to say:

Examiners seem not to be informed. They do not seem to have any training in EE approaches. Their questions are not in line with EE approaches. (H8/3/2)

In summary based on the responses comments and observations from the fore-going, the following issues seem to need to be addressed in order to alleviate practical problems faced by college lecturers:

- (i) time allocation and distribution of periods for environmental education in the college curriculum.
- (ii) practical work and examinations
- (iii) . . lack of support for EE from college administrators
- (iv) . . the status of environmental education in the colleges.

Some of these issues will be picked up latter in Chapter 6. However in the opinion of the researcher, supported by the views of environmental educationists outlined in the Chapter Two, these issues need to be attended to as a matter of urgency if environmental education is to be taught meaningfully.

Having discussed how the organisation of colleges affected the implementation of environmental education programmes, the researcher went on to find out what other problems environmental educators faced, if any. To this end, the following question was put to the respondents:

Do you or any college lecturers experience any other problems in teaching EE?

Table 5.5 : Summary of responses to the question:

Do you or any other lecturers experience any other problems in teaching EE? (Q.17)

NO	11
YES	5
No answer	1

Eleven of the 17 interviewees said neither they nor their colleagues experienced any other problems in teaching environmental education (Table 6.5). Five of the respondents answered in the affirmative. Two of the five pointed out that the major concern for them was knowing how to deal with inter disciplinary teaching. One of them said:

We are not quite sure of how to implement some of the EE approaches e.g. democracy and problem solving. (C3/3/2)

The other respondent had a similar response:

Yes, I find problems with teaching EE through other subjects. (D4/2/1)

The researcher would like to point out the consistency in the responses of these two respondents to this and an earlier and almost similar question (i.e. Question 12, Appendix 2^B). Three of the six respondents had mentioned that inadequate time had been allocated to the teaching and practice of environmental education in their colleges. One said:

Yes there is not enough time to do all the things that are required in EE i.e. outdoor projects and community involvement. (E5/3/2)

The other said:

Number of periods do not allow us to demonstrate the interdisciplinary nature of EE. (H8/3/3)

One respondent mentioned the issue of finance which had not been raised before. He indicated that lack of financial resources at departmental level was one of the reasons why certain aspects of the environmental education programme such as community involvement and practical projects, could not be undertaken in the colleges. He pointed out that in his college, departmental budget allocation was for Geography and environmental education and yet environmental education was using up all the funds. This caused tensions amongst the lecturers in the department. The issue of finance was by no means peculiar to that college. In the experience of the researcher, it is partly the reason why simple outdoor projects such as gardening, planting, cleaning, checking erosion and even short excursions are not undertaken by environmental education students in other colleges as well because some of the colleges would not spend any funds on simple equipment such as wheelbarrows, spades, shovels, seedlings, water pipes and garbage bins. However, it is the contention of the researcher that finance should not be a reason for environmental educators to refrain from doing practical projects, for there are several activities that students could undertake which would not require financial resources, e.g. environmental awareness campaigns within the college community.

Having established what problems college lecturers face with regard to the implementation of environmental education programme, the researcher wanted to find out how seriously the respondents viewed the problems of time and period allocation, bureaucracy, interruptions in college semesters, finance as problems inhibiting the proper implementation of environmental education programmes in the colleges. To this end, the following question was put to the respondents:

"How serious do you consider these problems?"

Table 5.6 : Summary of responses to the question: How serious do you consider these problems? (Q.18)

Very serious	7
Fairly serious	7
Not serious	1
Does not answer	1
No problems	1

Table 5.6 summarises the responses, while Appendix 2^B (Q18) gives more detail. The respondents who answered by saying "serious" were classified amongst "fairly serious" because the researcher felt that their responses were indicative of the fact that the problems were serious enough to warrant attention which is what the category "fairly serious" denotes in this particular instance. This categorisation was explained to the respondents at the time of the interview.

From Table 5.6, it will be noted that seven of the respondents viewed one or more of the following problems -

- time allocation for environmental education
- college timetables
- bureaucracy in colleges
- lack of practical components in environmental education examinations
- lack of practical project in environmental education generally
- the inability of lecturers and students to be involved in community projects, or
- the inability to approach environmental education from an interdisciplinary perspective -

as very serious problems. (These were problems the respondents had mentioned individually). One respondents had indicated that there was a need for environmental education practitioners to focus on the practice of environmental education in order to highlight problem areas and thereby find ways to deal with such problems. This was how he put it:

There is a need for more focus on environmental education. The time-table must change. The college day must also be flexible. (F6/2/2)

Another lamented:

The fate of environmental education is at stake. (H8/3/2)

Seven of the respondents thought that the problems facing the successful implementation of environmental education were "fairly serious". One of them pointed out that inadequate number of

periods were allocated to environmental education and therefore it made it difficult for the knowledge and skills acquired in environmental education theory to be translated into practical and tangible projects. He noted further that this underlined the seeming separation of theory from practice in environmental education, which is a problem that afflicts subject disciplines [and which environmental education seeks to overcome]. In his words:

Fairly serious; especially shortage of periods which militate against practical application of environmental education knowledge and skills. There is no correlation between theory and practice. (D4/2/2)

Only one of the respondents was of the opinion that the issues raised did not constitute serious problems, while another felt that there was no problem at all with the implementation of environmental education in his college.

It was necessary at this point to find out from the respondents whether, in their view, any of the problems mentioned earlier, were as a result of (the perceived) difference between an interdisciplinary curriculum on one hand and subject based disciplines on the other. To this end the following question (Q20 Appendix 2^B) was put to the interviewees:

Are any of these problems related to the difference between the interdisciplinary nature of EE and subject based college curriculum?

Table 5.7 : Summary of responses to the question: Are any of these problems related to the difference between the interdisciplinary nature of EE and subject-based college curriculum? (Q.20)

YES	9
Not sure	5
NO	3

Table 5.7 summarises the responses obtained. It shows that nine of the lecturers believed that some of the problems alluded to earlier arose because of the difference which exists between the interdisciplinary nature of environmental education and the dominant subject-based curriculum found in the colleges. One of the respondents pointed out that some of his colleagues failed to realise the difference in approaches between environmental education and other subject disciplines. He was of the opinion that college administrators in particular had little understanding for environmental education lecturers' approaches to teaching, which to them seemed to be unorthodox. His answer was:

Yes, this is because many people fail to realise that there is a vast difference between environmental education approaches and those of other subject disciplines. (D4/2/2)

This observation is supported by the views of other respondents who argued for example:

There is a conflict between the established system and EE which is new and different. (F6/2/1)

One of the interviewees, in the interpretation of the researcher, referred to the need for more time, flexibility and freedom from rigid schedules, which environmental education needs but is denied because people in general do not understand. Respondent D6/2/2 puts it this way:

.....people do not understand what EE stands for (D6/2/2).

Five of the interviewees were not sure whether problems affecting the implementation of environmental education were due to a difference between subject based disciplines on the one hand, and an interdisciplinary environmental education on the other. This finding is important because in the opinion of the researcher, the ability or inability of an environmental educator to perceive the fundamental causes of the problems he is faced with, could (in the implementation of an interdisciplinary curriculum), determine to a certain extent, whether the individual will be able to deal with them or not. If one does not understand the precise causes underlying a problem, one is unlikely to be able to deal with it effectively.

Having explored respondents views on perceived problems in the implementation of environmental education, respondents had an opportunity to suggest possible solutions to the problems.

SUGGESTED SOLUTIONS TO PROBLEMS

In this section, interviewees were given an opportunity to suggest what they thought could be possible solutions to the aforementioned problems. To this end the following question was asked:

Can you make any recommendations as to how the problems mentioned can be overcome?

Table 5.8 : Summary of responses to the question:

Can you make any recommendations as to how the problems mentioned can be overcome? (Q.19)

Number of periods / college timetable	13
Examinations and practical work	7
In-service training	1
EE as a major course	1
College bureaucracy	1
Change in curriculum policy	1

Thirteen of the interviewees referred in their responses to the number of periods allocated to environmental education being inadequate, as well as to the manner in which the college timetable affected the proper implementation of environmental education. Some of the respondents from this category expressed the feeling that the three 45 minute periods per week, as stipulated in the environmental education syllabi, were inadequate. There was a general suggestion that the number of periods needed to be increased. Seven periods per week was a common figure quoted by the respondents but some of them suggested nine periods. Examples of the responses are:

....the number of periods allocated to EE is not adequate. Seven periods per week would be ideal. (H8/3/1)

and:

There should be seven periods per week instead of the current three so as to enable teachers and students to undertake practical work and field excursions. (D4/2/2)

Another issue raised in connection with the college timetables was the way in which it was organised. The issue ranged from lecturers' non-involvement in the drawing up of timetables to the way in which the nominal three periods were allocated on the timetables (See Appendix 2^B). In three colleges all three periods were blocked into one weekly unit. Lecturers felt that this was unsatisfactory. They could not teach effectively for three continuous periods. This was what one lecturer observed:

EE periods should be properly allocated on the college timetable; the current three periods en block is not satisfactory. (E5/3/3)

However, one lecturer expressed a contrary view when he proposed that environmental education should be timetabled in such a way that it stretched over a lengthy period of time so as to provide lecturers with sufficient time in which to deal with all the relevant issues pertaining to environmental education. He suggested the following:

At least EE periods should stretch for 2 hours at a time in order to allow for its proper implementation. (H8/3/3)

The issue of lack of flexibility in relation to the way in which colleges are organised and the timetables, were also raised by some of the interviewees. They were of the opinion that the day to day administration of college programmes was too regimented without much room for innovation and experimentation. It was their opinion that there was a need for less emphasis on regimentation and a lot more flexibility which would enable environmental educators to implement their programmes properly. One of the interviewees said:

There is a need for more flexibility ... Lecturers should have the freedom to experiment. (G7/2/2)

It is clear from these responses given by the interviewees that the issue of periods and the way in which colleges are organised and managed are matters of concern to environmental educators. It is also apparent that there is a need for these issues to be reviewed and appropriate solutions found.

Seven of the respondents had noted that environmental education was currently too examination orientated and that not much attention was being paid to other valuable aims and outcomes of environmental education such as attitude change, values clarification and practical projects. They pointed out that examinations were solely based on written papers without any practical components to them. Some of them were of the opinion that changes to the structure of examinations to include practicals, would be beneficial to the proper implementation of environmental education.

One of the respondents pointed out that:

.....examinations should not only be based on written work, it must include practical work also. This change in evaluation is important because it could result in a useful ripple effect in EE. (B2/2/1)

Another lecturer had this to say:

.....evaluation should also be based on practical work and not just on written examinations. Examination centredness defeats the whole purpose of EE. (H8/3/1)

Some of the lecturers noted that examination questions usually did not reflect the principles of environmental education. One of them observed as follows:

Examiners should be people well versed in environmental education approaches. Examiners must set examination questions that are based on environmental education principles. (H8/3/2)

The views of one of the lecturers seemed to summarise the concerns and expectations of all the others:

There is a need to bring the whole college curriculum and structure in line with demands of practical and relevant education which is what EE stands for. (F6/2/1)

This is a view which the researcher ascribes to. The aims and principles of environmental education will be difficult to achieve to any appreciable degree unless conditions in colleges are reconciled with what environmental education stands for. This view is attested to by one of the interviewees who remarked that:

Unless educational planners and administrators realised the importance of EE, it will be regarded as an insignificant course by students and EE implementation and all the attendant problems will remain. (C3/3/1)

One lecturer referred to the need for in-service training for environmental educators to enable them to improve their professional skills and competency.

In order to find out whether college lecturers had any other issues to talk about in relation to the implementation of environmental education, the following question (Q22, Appendix B²) was put to them:

Would you like to make any other comments with specific reference to the interdisciplinary nature of EE at college or school level?

Six of the interviewees had further comments to make. One of them was of the opinion that there should be proper co-ordination between college campus programmes and those of non-governmental organisations (NGO's). This was how he put it:

Co-ordination between college campus programmes e.g. cleaning up campaigns, gardening, tree planting, checking soil erosion etc, and those of non-governmental organisations would be a great asset to the EE programme. (B2/2/1)

The researcher is inclined to support this view, given the findings of this study which suggests that college lecturers have difficulty in organising practical projects, as well as getting students involved in community development. In the experience of this researcher, college lecturers are too pre-occupied with preparing their students for examinations to get them to seriously consider these aspects of environmental education. This is coupled with the fact that these aspects are not examinable. Some lecturers also do not seem to know exactly how to involve their students in practical outdoor projects. It might therefore be a good idea to involve NGO's in college environmental education programmes, where the role of the NGO's would be to identify worthwhile practical community projects and to lead the way in showing students and lecturers how to get involved in such projects. Their role in this regard would be to provide the motivation, direction and the impetus after which such projects could be handed over to the college lecturers to carry through.

The second issue raised in response to Q22 was the view that environmental education should be taught as a discipline so as to get students interested in the course.

EE should be taught as a discipline, both at college level and at school level, because once taught interdisciplinarily, students tend to be reluctant to study the

course e.g. outdoor activities are seen as a waste of time. This is because they are non-examinable. (D4/2/2)

The researcher does not agree with this view for several reasons:

- (i) Environmental education seeks to expose the limitations of subject disciplines, (Chapter Two) hence the emphasis on an interdisciplinary approach to environmental education. To resort to a disciplinary approach to environmental education would defeat one of the internationally held principles of the Tbilisi declaration.
- (ii) The respondent is assuming that "lack of interest" on the part of students is because environmental education is taught from an interdisciplinary perspective. What has been established in this study is the fact that some lecturers have problems in understanding interdisciplinary teaching and how it is to be implemented. It could well be that the way in which environmental education is taught by lecturers is what causes students to be "not being interested in studying it".
- (iii) Finally, the respondent seems to assume that 'interdisciplinary' is equivalent to outdoor activities or a field of study being non-examinable. Outdoor activities and examinations are not directly translatable into interdisciplinary teaching. This observation by the respondent shows a poor understanding of the issues surrounding an interdisciplinary approach to environmental education.

There was a response from yet another lecturer, on the issue of allowing all students in colleges to study environmental education at one time or another during their stay in college. The respondent said:

The aims of EE will be best achieved if all students in the college had an opportunity to study EE. In my opinion the current 3 year programme could very well be covered in one year. If this were the case, it would give every student an opportunity to study EE at one time or the other during their stay at college. (E5/3/2)

The researcher would like to agree with the respondent on two counts:

- (i) That environmental education should be studied by all students at college level. This will be in keeping with the Tbilisi guideline wherein environmental education is aimed at as wide a cross-section of the world population as possible.

- (ii) That the environmental education course should have more content than is presently the case and that more time should be allocated to it. It will be noted that the latter part of this suggestion has already been effected in three colleges of education in Bophuthatswana as from the beginning of the 1993 academic year. The three-year syllabi have been abridged into a one-year course. The problem, however, is that the course is for one year and the abridged syllabus is rather inadequate. Not all students in colleges are expected to study environmental education even in its revised form. Students in the secondary streams have the option of studying environmental education as a major course for three years, but those in the primary departments do the abridged course for only one year. This in the view of this researcher is likely to adversely affect the effective implementation of environmental education programmes at primary and middle school levels where there is a need for a firm foundation to be laid in terms of environmental consciousness.

A final point worth noting concerns the training of environmental educators which was proposed by one of the interviewees. He suggested that lecturers who teach environmental education should be fully trained. He said:

Lecturers who teach EE should be fully trained even if this only means some kind of intensive in-service training. This could happen say twice a year. (H8/3/1)

This suggestion is worth considering in the light of the findings of this study. Lecturers do not seem to have a clear understanding of what is required of them as environmental educators. The majority of them have had no formal exposure to environmental education, its principles and approaches. Therefore a programme of in-service training which is aimed at improving the knowledge, skills and competence of lecturers on environmental issues, principles and practices would be invaluable.

RATINGS OF THE SUCCESS OR OTHERWISE OF THE IMPLEMENTATION OF ENVIRONMENTAL EDUCATION

Having dealt with issues relating to opinions of respondents on the interdisciplinary nature of environmental education, problems and suggested solutions, it seemed useful to ascertain how lecturers rated the success (or otherwise) of the implementation of environmental education programmes in their own colleges. In order to do this, the following question (Q21, Appendix 2^B) was put to the respondents:

How successful do you rate the implementation of EE in your college?

Table 5.9: Summary of responses to the question:
How successful do you rate the implementation of EE in your college? (Q.21)

Very successful	0
Successful	4
Average	5
Not successful	7
Poor	1

It is significant to note (Table 5.9) that only four of the 17 lecturers interviewed felt that the implementation of environmental education in their colleges was successful. That is approximately 25% of the respondents. It should be noted here that in discussions with interviewees, "success" seemed to be measured mainly in terms of how well students performed in examinations. This was how respondents viewed it:

On paper it might look successful because EE students pass their examinations very well, but it is doubtful if their attitudes are positively impacted upon by their study of EE. It is also doubtful whether the practice of EE conforms with guidelines of the Tbilisi Declaration, the Belgrade Charter and the World Conservation Strategy. (E5/3/2).

It will be noted from this observation that other aims and outcomes of environmental education other than the acquisition of knowledge, such as problem-solving skills, community involvement, attitude change and value clarification, are not accounted for even though these are high priorities in the aims and objectives of environmental education (See Chapter Two).

Five of the respondents were of the opinion that the implementation of environmental education in their colleges was average. This was clarified in further discussions with them respondents as meaning "barely satisfactory".

Seven of the respondents were of the opinion that the implementation of environmental education at their colleges was "unsuccessful". If in the assessment of the practitioners themselves their practice is unsuccessful or poor, then in the opinion of this researcher, there is a need to tackle the factors which militate against success, aggressively.

SUMMARY AND COMMENT

From the foregoing, it will be realised that about 40% of the lecturers interviewed suggested that in their view, the implementation of environmental education in their colleges was unsuccessful. In the view of this researcher, this situation is serious enough to warrant closer attention being paid to the factors affecting the successful implementation of environmental education in colleges of education in Bophuthatswana, with the view to remedying the situation.

In Chapter 6, a summary and analysis of these findings will be presented.

CHAPTER 6

CONCLUSIONS, PROPOSALS AND EVALUATION

INTRODUCTION

This study has focused on the implementation of an interdisciplinary environmental programme within a predominantly disciplinary curriculum framework of the colleges of education in Bophuthatswana. It highlighted arguments surrounding the paradigm which underpins the reductionist-mechanistic worldview, and the new and emerging paradigm which embodies whole-system perspectives and interdisciplinarity. The tensions between these two paradigms are reflected in the conflict between theory and practice and between the ideal and the reality as some findings of this study will suggest. The limited understanding of environmental education terms and concepts shown amongst respondents is a manifestation of lack of clarity in the literature as the ensuing summary and discussions of the findings will show.

SUMMARY

The following findings seemed to emerge from the study:

- (i) The extent to which environmental education was implemented varied from one college to the other and there were a number of college related factors which seemed to influence this variance (Chapter 3).
- (ii) Environmental education lecturers in the colleges lacked experience and training (Chapter 3, Tables 3.2 and 3.3).
- (iii) There was evidence of limited understanding amongst lecturers of environmental education, of the nature of environmental education as well as of the concepts and terms, including the interdisciplinary nature of environmental education (Chapter 4).
- (iv) There is a lack of clarity and ambiguity in [both local eg Hurry 1980/1981, O'Donoghue 1986 and] the international literature on environmental education (Lit. Review, Chapters 4 and 5).

- (v) It was evident that there were problems with the implementation of environmental education programmes in the colleges of education in Bophuthatswana, particularly regarding an interdisciplinary approach (Chapter 5).

FACTORS INFLUENCING THE VARYING EXTENT TO WHICH ENVIRONMENTAL EDUCATION SEEMED TO BE IMPLEMENTED WITHIN COLLEGES

The subject policies of the various colleges determined to a certain extent how environmental education was implemented within the colleges. For example, it was evident from the study that the subject grouping in a college i.e. environmental education being grouped with subjects like Music, Fine Art, Needlework, Physical Education and Guidance and Counselling), determined how environmental education was timetabled (Chapter 3). In colleges in which environmental education was grouped with subjects which required three consecutive periods per week, e.g. Fine Art and Music, this had to apply to environmental education as well. Some lecturers complained that this was not conducive to the effective teaching of environmental education, but others recommended such a block session (Chapter 5). It was also found that the lower status of environmental education whether as an ancillary course or an enrichment course might have an influence on the degree to which it was being implemented (Chapters 3 and 5).

The personalities of the lecturers who implemented environmental education programmes seemed to influence the extent to which the course was implemented (Chapter 3). It seemed that lecturers who had forceful personalities and who pursued environmental education vigorously at their colleges at which they taught, made a very positive impact with the implementation of environmental education programmes. It also seemed that colleges that have had environmental education as part of their curriculum for a considerable length of time, had a firmly established environmental education tradition (Chapter 3).

The curriculum policy of the Institute of Education of the University of Bophuthatswana and the Department of Education seemed to influence the implementation of environmental education in various ways (Chapter 3). For example from the beginning of 1993, three colleges have been earmarked to implement environmental education as major courses in those colleges. This placed environmental education on equal footing with other major courses in the colleges with all the accompanying advantages such as adequate time allocation of seven periods per week. All the other

colleges maintain environmental education as an ancillary course — in one case as merely an enrichment course (Chapter 3).

PROBLEMS WITH THE IMPLEMENTATION OF ENVIRONMENTAL EDUCATION PROGRAMMES WITHIN THE COLLEGES

Interview results indicated that college lecturers faced problems in the implementation of environmental education (Table 5.6). Seven of the interviewees considered the problems they faced to be very serious. Eight said the problems were serious enough to warrant attention. Only two of the 17 lecturers interviewed did not think there were any serious problems with implementing environmental education in their colleges. The problems which were generally alluded to were:

- Lack of clarity on the interdisciplinary approach to environmental education (Table 5.4)
- Lecturers' lack of training in environmental education approaches
- Inadequate time allocation on college timetables for environmental education (Table 5.8)
- The dichotomy between subject disciplines and an interdisciplinary approach to environmental education (Table 5.8)
- The status of environmental education in some colleges
- The bureaucratic nature of college administrations and, in some cases, the lack of support from them.

In the view of the researcher, these problems can be attributed to two main findings from the study (See Fig. 6.1)

1. There was evidence from the study to suggest that interviewees on the whole had limited understanding of environmental education concepts and terms such as interdisciplinary, multidisciplinary, cross-curricular, integration and transdisciplinary (Chapter 4). This situation could be attributed to:
 - (a) The fairly general lack of clarity of concepts and terms used in the environmental education literature both locally and internationally (Chapter Two)
 - (b) Lecturers being generally inexperienced in the teaching of environmental education and the majority not having had any (formal) training in environmental education (Tables 3.2 and 3.3).

2. The dichotomy between theory i.e. an interdisciplinary approach to environmental education as proposed in the international and local literature (Chapter 2) and the practice within the curriculum framework of colleges of education, which is predominantly subject-discipline based. This dichotomy reflects the conflicting world views of the reductionist-mechanistic paradigm and a new and emerging environmental paradigm (Chapter 2). Examples of constraints arising from this dichotomous structural situation are:
- (a) The ideal is to teach environmental education from an interdisciplinary perspective but the rest of the college curriculum is discipline-based.
 - (b) Lecturers and students seem to tend to have a disciplinary mindset
 - (c) Environmental education should aim at attitude change, community involvement, problem solving, skill training and critical thinking skills, but the curriculum policy of government and colleges is examination-orientated and inflexible and frustrates these objectives.

The foregoing can be graphically represented as follows:

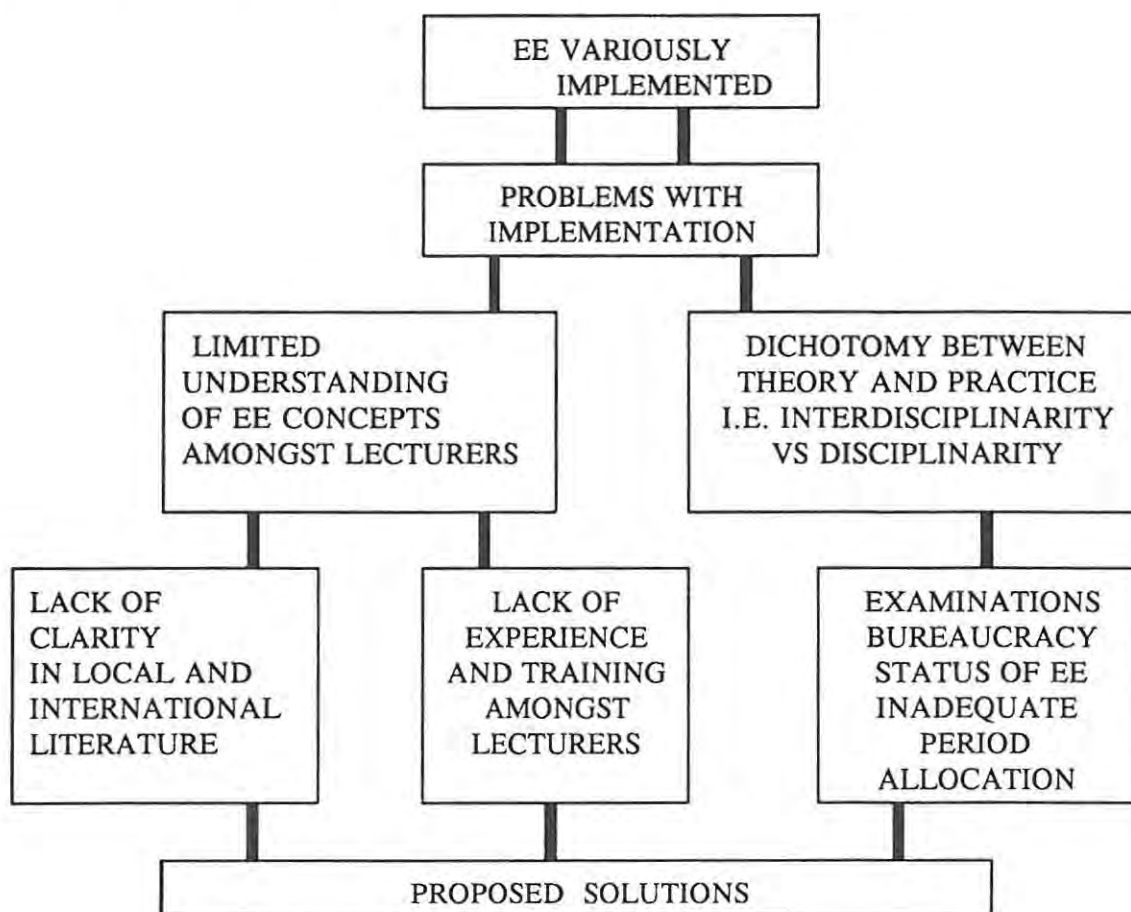


FIGURE 6.1: GRAPHICAL REPRESENTATION OF FINDINGS AND CONCLUSIONS

LECTURERS' LIMITED UNDERSTANDING OF ENVIRONMENTAL EDUCATION CONCEPTS AND TERMS AND PROBLEMS OF IMPLEMENTATION

Of the 17 lecturers interviewed, only four indicated that they were very familiar with the principles which underpin the teaching of environmental education (Approximately 25%). Thirteen lecturers showed a limited understanding of environmental education principles, and others had very little or no idea of what these principles were (Approximately 70%, Table 4.1). When asked whether they thought there was a significant difference between environmental education approaches and those of subject disciplines, four lecturers seemed to think there was no difference. Even though 14 of the respondents had said they thought there was a difference, some of their explanations were ambiguous (e.g. F6/2/1, Table 4.3).

Table 4.4 shows that three lecturers did not clearly understand what environmental education approaches were. Two of the respondents were ambiguous in their responses. Thirteen of the

respondents showed a reasonable understanding of environmental education approaches. When asked to select from a set of descriptions of the term interdisciplinary, 15 of the respondents showed an understanding of the term interdisciplinary. However there were instances in which their responses were fairly superficial (Table 4.5).

When respondents were asked what they understood by the term 'multidisciplinary' in relation to environmental education, five of the them said they did not understand the term (Table 5.6), while the other 12 respondents showed a limited understanding. The term multidisciplinary was generally poorly understood by the respondents. However, respondents showed a very good understanding of the term holistic (Table 4.7). Only two interviewees did not know what the term holistic meant. There was a general lack of understanding of the term integration but there were two respondents who showed good understanding of the term. However three respondents did not understand it (Table 4.8). Two respondents could not explain what teaching environmental education across the curriculum meant. The remaining 15 respondents showed some understanding but in some cases, it seemed superficial (Table 4.9). The term transdisciplinary was the least understood by the interviewees. Nearly all of them showed limited understanding of the term (Table 4.10).

Given that 'interdisciplinarity' is one of the important principles of environmental education (Chapter 2), and that the related concepts explored in this study are also used to describe the nature of environmental education in the literature, the fact that the lecturers seemed to have a limited understanding of these terms, could be a contributory factor to the problems they face in implementing environmental education from an interdisciplinary perspective.

LACK OF TRAINING AND INEXPERIENCE AMONGST ENVIRONMENTAL EDUCATION LECTURERS AND PROBLEMS OF IMPLEMENTATION

There was direct verbal evidence from the study to indicate that the problems of implementation of environmental education programmes in the colleges of education in Bophuthatswana could be partly attributed to the general lack of training amongst lecturers of environmental education as well as insufficient experience. Table 3.2 shows that only two of the interviewees had had formal training in environmental education. Four had had limited training while 11 had no training at all. Table 3.3 indicates that only two lecturers had taught environmental education for up to four years. Nine of the 17 interviewed had taught environmental education for less than a year at the time of this study. Another factor which emerged from the researcher's informal discussions with interviewees was that better job offers elsewhere led to experienced lecturers leaving the colleges and inexperienced lecturers being appointed in their places (Chapter 3).

LACK OF CLARITY OF CONCEPTS AND TERMS IN THE ENVIRONMENTAL EDUCATION LITERATURE, AND PROBLEMS OF IMPLEMENTATION

From the literature that the researcher has reviewed for this study, there seems to be a lack of clarity and at times ambiguity about environmental education particularly its interdisciplinary approaches and related concepts. For example:

Interdisciplinary teaching is teaching in which two or more disciplines are expressed in terms of interrelationship. (UNESCO-UNEP 1985b, p.3)

In the view of this researcher, it is very difficult for one to determine from this definition precisely what an interdisciplinary way of teaching is and how it can be translated into tangible classroom practice. It becomes even more bewildering for environmental educators who have not been trained in this approach as suggested by the findings of this study. This view seems to be confirmed by the leading international organisations UNESCO-UNEP (1985b), when it declared:

This definition is so general, however, given the multiplicity of approaches to the problem that it leaves many questions unanswered (p.3)

Some of the questions which UNESCO-UNEP (1985b) agreed arise are:

- What is the possible relationship amongst disciplines?
- How are disciplines co-ordinated in time? In space?
- What is each teacher's role?
- Does this require changes in teacher's time schedule, in their pedagogical training? (p.3-4).

These are questions which also seem to have been raised in this study (Chapters 4 and 5). Writers like Maher (1986), Robottom (1987), Vulliamy (1987) and Ackerman (1989) have all used the term without clarifying it adequately (Chapter 4). The same can be said of the use of the term multidisciplinary where the question arises as to whether the term interdisciplinary means the same as multidisciplinary? Again this term has been used by writers such as Goudswaard (1977) Duigan *et al.* (1982) and Stevenson (1988) without clarifying it sufficiently (Chapter 4).

The researcher's viewpoint is that a lack of clarity and sometimes ambiguity in environmental education literature and guidelines may partly account for some of the problems encountered in the implementation of environmental education programmes.

DICHOTOMY BETWEEN THEORY AND PRACTICE, AND PROBLEMS OF IMPLEMENTATION

Table 5.1 shows that 15 respondents agreed that environmental education should be taught from an interdisciplinary perspective, but only eight said they could actually do that (Table 5.2). It is worth noting that ten of the 17 lecturers indicated that they could not teach environmental education on an interdisciplinary basis. Table 5.4 shows that 15 of the lecturers were of the opinion that an interdisciplinary approach could cause problems for teachers in schools. This finding is attested to by UNESCO-UNEP (1985b) when it was stated:

There still has not been enough thinking, enough experimentation, [in interdisciplinarity] that is well-grounded, systematic research to remedy the defects. Research should bear on teaching methods and of course on training teachers. For interdisciplinarity can create an uncomfortable pedagogical situation for the teacher (p.41).

Partly, the theory-practice dichotomy seems to lie in structural and other constraints on the implementation of environmental education. For example the curriculum structure in the colleges are discipline-based and examination-orientated with the result that environmental education also comes to be examination orientated as well. The issue of college bureaucracy (Chapter 5), which manifests itself in a lack of support for environmental education in some of the colleges, is also part of this dichotomy between theory and practice. This dichotomy might be ascribed to the tensions between more conventional and emerging curriculum paradigms (Chapter 2), leading to a situation where environmental education which is supposed to be non-disciplinary, holistic and integrated is having to be taught through the medium of subject disciplines.

Having summarised factors which result in problems of implementation of environmental education programmes in colleges of education in Bophuthatswana, I now turn to some of the solutions proposed by the interviewees.

PROPOSED SOLUTIONS

Table 5.8 indicates solutions proposed by some of the respondents. The lecturers tended to make suggestions of practical but fairly superficial in nature. Ten of them felt increasing the number of periods allocated to environmental education (from 3-7 per week) would enable them to effectively teach environmental education with an interdisciplinary focus. The same number of interviewees suggested other timetable changes to allow for effective implementation of environmental education. Seven of the respondents suggested the inclusion of a practical component in environmental education examinations. Three interviewees indicated that there was a need for in-service training for lecturers. One interviewee was of the view that the status of environmental education needed to be upgraded from an ancillary course to a major course. There was a suggestion by one

respondent that there was a need for college administrators to become more environmentally conscious. Finally, there was a proposal from one lecturer that there was a need for a change in curriculum policy to accommodate interdisciplinarity.

In the opinion of the researcher, only two of the proposed solutions by interviewees, seemed to touch on the crux of the problems of implementation of environmental education in the colleges as the findings of this study suggests. The respondents suggested:

- In-service training for lecturers
- Changes in curriculum policy.

This is because, as shown in this study, the problem of implementation of environmental education seems to be related to:

- A limited understanding of environmental education concepts, terms and approaches
- A lack of environmental education experience amongst lecturers
- A lack of clarity in environmental education literature
- A dichotomy between theory and practice.

In the researcher's view, the fact that the majority of interviewees proposed an increase in the number of periods allocated to environmental education and the inclusion of a practical component in the examination of environmental education would seem to suggest a lack of understanding of the real problems. In addition to the two solutions alluded to earlier in this chapter, the researcher would like to propose the following solutions:

- (i) There is a need for clarity in the environmental education literature on the various terms used and concepts recommended, so that environmental educators will be able to develop a clearer understanding of their practice
- (ii) There is a need for environmental educators to be formally trained so that they will (a) have the opportunity to work through and practice such concepts and (b) would not have to abandon the teaching of environmental education after a while to teach something with which they have greater familiarity (Chapter 3)
- (iii) There is a need for clear and unambiguous guidelines on conceptualising and implementing interdisciplinary approaches to environmental education, to ensure that internationally recommended principles and approaches of environmental education can be effectively translated into workable classroom practice.

CONCLUSION

As has been noted by UNESCO-UNEP (1985b), there are important elements to consider in conceiving a project like environmental education — that is to help teachers to co-ordinate their activities by giving them more ample descriptions of their tasks including ideas on how to accomplish these tasks, and showing them how to build bridges between disciplines, how concepts from other disciplines can be identified and integrated, taught holistically across the curriculum as well as from interdisciplinary, multidisciplinary and transdisciplinary perspectives.

EVALUATION

Even though time constraints and pressure of work would not allow the researcher to undertake a more detailed research project, the researcher nonetheless has gained very useful insights, skills and almost invaluable experience in the conduct of this study. This puts the researcher in a position to suggest that:

- extensive workshops with interviewees would have been very useful for the researcher to have gained deeper insights into the practice of environmental education in the colleges than was possible with the semi-structured interviews and the limited workshop session used in this study;
- when the interview technique is used as an instrument for data collection, it would have been useful to have had follow-up interviews to have enabled the interviewees to clarify responses which were unclear in the first interview;
- data collection therefore needs to be done over a more extensive period of time than was the case with this study, to allow the researcher to carefully think through his instruments of data collection, as well as the initial responses obtained to enable him to make the necessary adjustments so as to obtain a more comprehensive picture of what he intends to study.
- data collection proceedings should have been recorded on a video tape so that during the write up period of the study (which is usually quite extensive), the

researcher would have the benefit of playing back the events to refresh his memory, so that the presentation in the form of research document would be a lot more vivid and true-to-reality.

This study, it is hoped, will make a contribution to the current curriculum debate on environmental education in southern Africa and particularly in South Africa. For example following a policy workshop held at Dikhololo near Brits in August 1993, the following proposals were put forward as a basis to develop a curriculum framework for environmental education, for South Africa, for public debate and comment:

- an integrated cross-curricular approach [to EE] in the Primary Phase
- an integrated subject or modular approach in the Secondary Phase
- a discrete subject in the Tertiary Phase

(Council for the Environment 1993 p.7)

If, as the authors of the document propose, there is a need for public debate and participation in this curriculum debate, then this study would suggest that the proponents of the document need to clarify terms and concepts eg. "integrated cross-curricular approach," used in the document so that the reactions and inputs from both the general public (most of whom may not be curriculum experts) and senior educators such as college lecturers, can be really meaningful. The results of this study indicate that a general, shared and clear understanding of terms such as these cannot be assumed; using them in an unclarified manner can thus only perpetuate the rhetoric-reality gap in tertiary environmental education. Following from and concurrent with such clarification, should be a fundamental re-thinking of the existing curriculum. As recommended by a college lecturer interviewed in this study:

There is a need to bring the whole college curriculum and structure in line with the demands of practical and relevant education which is what environmental education stands for. (F6/2/1).

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APPENDIX 1^A**CONFIDENTIAL****AN EVALUATION OF THE INTERDISCIPLINARY NATURE OF
ENVIRONMENTAL EDUCATION IN COLLEGES OF EDUCATION
IN BOPHUTHATSWANA**

This research is being undertaken for the degree of Master of Education (M.Ed.) in Environmental Education in the Department of Education at RHODES UNIVERSITY in GRAHAMSTOWN.

This interview schedule seeks to enable the researcher to gather information on the following:

- (i) Lecturers' perceptions and understanding of the interdisciplinary nature of the EE Curriculum at College level with specific focus on its interdisciplinary aspect (exploring related terminologies such as cross-curricular, integration, multidisciplinary, etc).
- (ii) Problems lecturers experience at College level with the possible duality between the interdisciplinary nature of EE and subject based curriculum, and ways in which they deal with these problems.

Thank you very much

Joseph Y. Akwa

Lecturer: Tlhabane College of Education

- Q1: Are you a lecturer in Environmental Education?
- Q2: To which students do you teach/lecture EE?
- Q3: For how long have you been teaching/lecturing EE?
- Q4: Did you have any training in EE?
- Q5: How familiar are you with the internationally accepted principles of EE? (by principles I mean key aspects which inform the teaching of EE)
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- Q6: Can you mention some of these principles of EE which you regard as important? ...
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- Q7: Do you think that there is a significant difference between approaches used in other subject disciplines (i.e. the principles underlying other subject disciplines)? Please explain your answer.
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- Q8: Several international documents recommend that EE should be approached from an interdisciplinary perspective. What is your understanding of the term "interdisciplinary"?
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- Q9: Which of the following do you consider as describing the term "interdisciplinary"? Please give reasons for your answers.
- i. EE should draw on available knowledge and skills from other disciplines.

- ii. A variety of methods be used in teaching EE.
- iii. Every subject discipline should incorporate EE.
- iv. Every subject discipline should be centred on the environment.
- v. EE should be used to link all subjects.
- vi. All subject lecturers should take (adopt) an environmental approach.

(If the answer to iii. or iv. above was yes, ask "in what way")
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Q10: There are a number of other terms (terminologies) which are sometimes used to describe EE. How do you understand the following terms? or How do you think each of these differs from the term "interdisciplinary", if at all?

- i. multi-disciplinary
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- ii. holistic
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- iii. integrated
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- iv. trans-disciplinary
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- v. EE across the curriculum
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Q11: Do you agree with the opinion that EE should be taught from an interdisciplinary perspective?

If No: Why not? go to Q13

If Yes: Ask Q12

Q12: Do you find it possible to teach EE from an interdisciplinary perspective?

If No: Can you explain why not?

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If Yes: Do you mind explaining how you do this?

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If unsure: Would you explain why you are unsure?

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Q13: Do you think that a possible difference exists between a subject based curriculum and an interdisciplinary approach to EE as it is in colleges? If so, does this pose any problem to college lecturers?

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Q14: Do you think that it poses/could pose problems to teachers in School?

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Q15: What would you say is the perception of your students of the interdisciplinary nature of environmental education?

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Q16: How does the way in which the college is organised affect the implementation of EE in the college (i.e. time-table, exams, length of periods, etc)? Please explain.

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Q17: Do you or other college lecturers experience any other problems in teaching EE?

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Q18: How serious do you consider these problems?

Very serious?
Fairly serious?
Not serious?

Q19: Can you make any recommendation as to how the problems you mentioned can be overcome or alleviated?

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Q20: Are any of these problems related to the difference between the interdisciplinary nature of EE and the subject-based college curriculum? You may need to take some time to reflect on this.

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Q21: How successful do you rate the implementation of EE in colleges of education in Bophuthatswana? Very successful (5) Successful (4) Average (3) Not very successful (2) Poor (1)

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Q22: Would you like to make any other comments with specific reference to the interdisciplinary nature of EE at college or school level?

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Q23: Would you be interested in attending a workshop in which the interdisciplinary nature of EE is explored with other college lecturers in EE?

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OR

Q24: Would you like to receive documentation clarifying aspects related to the interdisciplinary nature of EE, resulting from this study?

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THANK YOU FOR YOUR CO-OPERATION

APPENDIX 2^A

RESPONSES TO QUESTIONS 5-10

QUESTION 5

Question:

How familiar are you with internationally accepted principles of EE (by principles I mean key aspects which inform the teaching of EE)

Responses:

- I am familiar (A1/1/1)
- I am familiar (B2/2/1)
- I am not familiar with them (B2/2/2)
- I am familiar (C3/3/1)
- I am quite familiar (C3/3/2)
- I am not sure (C3/3/3)
- I am familiar (D4/2/1)
- I am familiar (D4/2/2)
- To a certain extent (E5/3/1)
- Quite familiar (E5/3/2)
- I am familiar (E5/3/3)
- To a certain extent (F6/2/1)
- I am familiar (F6/2/2)
- I am familiar (G7/2/1)
- Quite familiar (G7/2/2)
- I am familiar (H8/3/1)
- I am quite familiar (H8/3/2)
- be interdisciplinary and holistic (not sure) (H8/3/3)

QUESTION 6

Question:

Can you mention some of the principles of EE which you regard as important?

Responses:

- The Tbilisi declaration : that of EE being a life long process of education both formal and non-formal. Also the problem solving approaches as well as some of the guidelines of the World Conservation Strategy (WCS) (A1/1/1)
- EE should be integrated with other subject disciplines. It should also be a life long process (B2/2/1)

- I do not know (B2/2/2)
- EE should be seen in its totality i.e. the relationship between man and his environment. Also the identification of environmental issues within ones community. The development of skills to tackle those issues (C3/3/1)
- The interdisciplinary approach to be taken by EE (C3/3/2)
- Creation of awareness and concern for the environment (C3/3/3)
- The interrelatedness of man and his cultural and physical environment i.e. the principles of ecology (D4/2/1)
- Protection of endangered species. Nature conservation (D4/2/2)
- EE should be seen in its totality. That EE should be a life long process (E5/3/1)
- The creation of awareness of the environment. That EE should be a life long process. EE should be an integral part of other subjects. EE should have a holistic approach. Students should be engaged in environmental issues. They should be directly involved in environmental affairs (E5/3/2)
- EE should be taught holistically i.e. the environment should be seen in its totality. EE should be interdisciplinary in its approach (E5/3/3)
- EE should be problem solving. It should be community orientated. Learners should participate. EE should be democratic i.e. learners' involvement (F6/2/1)
- EE should be action orientated. It should include community involvement. It should teach skills to solve problems. (F6/2/2)
- EE should be interdisciplinary. It should be a life long process (G7/2/1)
- EE should begin at childhood and should continue through adulthood i.e. a life long process. EE should be practical i.e. learners should use knowledge to improve on their immediate environment as well as their local community. It is about quality of life (G7/2/2)
- The idea that EE should be taught as formal course and also as non-formal. This is because it is difficult to introduce EE at tertiary institutions for the first time. This is because EE is not in pre-tertiary institutions (H8/2/1)
- EE should be a life long process. EE should not be taught only to a specific group of people — it should be taught to a broad spectrum of people. EE should enhance the understanding and interrelatedness or interrelationship between man and his environment. It should also aim at alleviating the problems which might arise as a result of the interaction of man and his environment. Broadening of the understanding of ecology. Creation of the understanding of ecology. Creation of awareness of the intricate problems which characterises day to day living (H8/3/2)
- EE should be interdisciplinary and holistic (H8/3/3)7

QUESTION 7

Do you think there is a significant difference between approaches used in EE compared to other subject disciplines?

Responses:

- Yes, there is a significant difference between EE approaches and that of other subject disciplines. Knowledge in other disciplines is acquired just for the purpose of doing specific tasks in a job. But in EE people are subjected to corrective measures. It touches everybody's life. For example subject a discipline such as Geography does not (A/1/1)
- Yes, subject disciplines are not practical enough but EE is. Other subject disciplines are not concerned about environmental degradation, but EE is (B2/2/1)
- Yes, it is different. EE has a cross curricula approach but other subject disciplines are compartmentalised. (B2/2/2)
- It depends on the subject area. Geography and Biology, for example, seem to have the same underlying principles. But the approaches in pure sciences such as Mathematics and Physics might be slightly different (C3/3/1)
- Yes, subjects like Physics, Mathematics deal with specific factual issues, EE is general (C3/3/2)
- There is minimal difference. Many subject disciplines use almost similar approaches (C3/3/3)
- There is no difference. This is because environmental education is also studied within the framework of Geography which is disciplinary. EE seems to be a tapestry of subject disciplines (D4/2/1)
- There is a difference in the sense that EE is taught as an interdisciplinary course whilst other subjects are taught as separate entities (D4/2/2)
- The current structure of EE (in the colleges of education in Bophuthatswana) is the same as other subject disciplines. This makes it difficult to do practical work because of limited time. But in principle EE is not supposed to be the same as other subject (E5/3/1)
- Yes, subject based disciplines are compartmentalised. EE seems to have no clear cut boundaries. EE emphasises common sense and general knowledge (E5/3/2)
- In other subject disciplines, compartmentalisation is the key. There seems to be no relationship with other subjects. But EE relates to every other subject at least in principle (E5/3/3)
- Certainly, there are subject disciplines in which all what the subject does is for learners to memorise and to learn for learning's sake. EE is learning for life (F6/2/1)
- Yes, there is. EE is supposed to be a way of life. It is interdisciplinary. It is to be taught using other subjects (F6/2/2)

- Yes EE should not be a subject but should be taught through other subject disciplines (G7/2/1)
- Yes, EE is not a subject. Other subject disciplines depend mainly on knowledge in the subject area. EE depends on all other subjects (G7/2/2)
- No, I do not think there is any difference because in Geography the objectives are life long goals. They are not that different (H8/3/1)
- Yes, traditional subjects are discipline centred but the approach to EE is interdisciplinary and should be taught through other subjects (H8/3/2)
- Yes, as concepts are confined to specific contexts (H8/3/3)

QUESTION 8

Question:

Several international documents recommend that EE should be approached from an interdisciplinary perspective. What is your understanding of the term "interdisciplinary"?

- It means cross-curricular. That is teaching EE in the medium of other subject disciplines (A1/1/1)
- It means mapping out a subject within various disciplines of concepts which are interrelated. Showing relationship of one subject area to the others (B2/2/1).
- I do not know (B2/2/2)
- The main idea behind interdisciplinary approach is to reach as many people as possible. Hence it entails EE cutting across as many subject disciplines as possible so that the main objectives are attained (C3/3/1)
- EE should draw on knowledge, information from other subject disciplines (C3/3/2)
- It should not be an isolated subject without it bearing on other disciplines (C3/3/3)
- This means holistic in approach. Specific topics and skills related to other disciplines should be incorporated in EE e.g. Atmospheric pollution in Geography also in EE, and so is ozone depletion etc. Some disciplines are more related to EE than others (D4/2/1)
- It means the inclusion of EE in other school subjects. This makes it interdisciplinary i.e. environmental issues in Biology and Geography (D4/2/2)
- This means the teaching of EE concepts in other disciplines. EE should not be compartmentalised like other subjects. It should not be a subject on its own (E5/3/1)
- EE should draw on knowledge from all disciplines. It means one should be able to relate EE to all other subjects (E5/3/2)
- It means EE should not be taught as a discrete subject. It should be related to other disciplines (E5/3/3)
- It means EE should be taught through other subjects (F6/2/1)

- Interdisciplinary means relating to all disciplines i.e. EE must be taught in all disciplines (F6/2/2)
- Interdisciplinary means that EE should be an approach to teaching i.e. teaching about environmental quality (G7/2/1)
- This means EE should be taught within all the subjects in an educational institution (G7/2/2)
- This refers to the idea that the information applicable to one subject discipline can also be used in another discipline i.e. using knowledge from Biology, Geography, History etc (H8/3/1)
- It is an approach or perspective in which traditional subjects should be used to achieve environmental education objectives. Subject disciplines used as a vehicle by which EE objectives are achieved (H8/3/2)
- It means EE is to be viewed as an interface for various disciplines (H8/3/3)

QUESTION 9

Question:

Which of the following do you consider as describing the term "interdisciplinary"? (Please give reasons for your answer)

Responses:

- (iii) and (v): . . . In English, for example, EE topics can be taught using theme teaching (in poetry as well). In Geography impacts of man's activities on the environment can be stressed. The method to be used in incorporating EE into other subjects will differ from one subject area to the other (A1/1/1)
- (i) and (v): . . . Using EE themes in subjects like English, Art and History (B2/2/1)
- (i), (iii) and (v): The environment can be used in the teaching of subjects such as Mathematics, where students are asked to identify measure and calculated angles in a building for example (B2/2/2)
- (iii): . . . Some subjects have components of EE but not clearly linked to the principles of EE. But for subjects like English, compositions could be on environmental issues. In Mathematics, learners deal with figures which have no meaning. Giving figures meaning by relating maths to the environment could be a way of incorporating EE into Mathematics or the other way around. (C3/3/1)
- (i), (iii), (iv), (v) and (vi): EE can be incorporated into a subject by citing examples for illustration from the environment in which the learner has contact with (C3/3/2)

- (iii) . . . The environment has to be used when grappling with difference subject matter (C3/3/3)
- (i), (iii) and (iv): All worthwhile knowledge should be environmentally related e.g. theme teaching (D4/2/1)
- (iii): . . . Through seminars or poetry, essay writing on environmental issues. Outdoor education or excursions as a strong component of Geography i.e. appreciation of nature (D4/2/2)
- (iii), (iv): . . . EE in its present form does not benefit every student because it is an ancillary. Therefore if taught as part of every subject, all learners will benefit. There are environmental issues in every subject so these must be emphasised e.g. the 1992 Special English (SPEN) paper 11. (E5/3/1)
- (i) and (ii): . . . (E5/3/2)
- (i) and (iii): . . . Available knowledge in subject disciplines e.g. Geography is related to EE and this is how they can be incorporated (E5/3/3)
- (iii) and (vi): . . . When a subject lecturer is preparing his lesson e.g. in science, he must also show how that science affects the environment adversely (F6/2/1)
- (i), (iii) and (iv): EE should be taught using the medium of other subjects i.e. through theme teaching (F6/2/2)
- (iii) and (v): . . . In English and in economics, environmental issues should be used and stressed. One can give students a passage with an environmental theme to work on (G7/2/1)
- (i) and (iii): . . . By teaching about the environment in every subject e.g. English and Geography (G7/2/2)
- (i): . . . (H8/3/1)
- (iii) and (iv): . . . It is possible to link all subjects to EE. Geography and biology easily lend themselves to this. But other subject such as English and Mathematics can also highlight environmental related issues (H8/3/2)
- (iii): . . . How the explained aspect is related to the quality and nature of the environment (H8/3/3)

QUESTION 10

Question:

There are a number of other terms (terminologies) which are sometimes used to describe EE. How do you understand the following terms? Or how do you think each of these terms differ from the term "interdisciplinary"?

Responses:

Multidisciplinary

- Many (several) subject disciplines gravitating to a common objective e.g. EE objectives (A1/1/1)
- The inclusion of several disciplines into EE (B2/2/1)
- I do not know (B2/2/2)
- I am not sure (C3/3/1)
- EE should not be confined to the approaches (methods) of a particular subject discipline (C3/3/2)
- I do not know (C3/3/3)
- As many disciplines as possible should be appealed to in EE. Gravitation of knowledge to the center (D4/2/2)
- I do not know (E5/3/1)
- A variety of disciplines must emphasise the EE component in them (E5/3/2)
- The way in which EE can be studied in a variety of disciplines (E5/3/3)
- I do not know (F6/2/1)
- EE should involve several disciplines (F6/2/2)
- Many subject areas i.e. EE should incorporate other subjects (G7/2/1)
- Include many subjects into EE (G7/2/2)
- This will refer to a situation in which information or material (knowledge) used in EE can be derived from a variety of sources or subjects or disciplines (H8/3/1)
- The inclusion of various disciplines within a particular discipline (H8/3/2)
- It involves all disciplines (H8/3/3)

Responses:

Holistic

- Broad, all embracing, all incorporating (A1/1/1)
- Unified knowledge - totality of the discipline (B2/2/1)
- I do not know (B2/2/2)
- I am not sure (C3/3/1)
- To view the environment in its totality. Every aspect of knowledge that has a bearing on life and the environment (C3/3/2)
- Should not ignore other segments of our society (C3/3/3)
- Treating the subject as a whole. From beginning to the end e.g. soil erosion and how it is caused, how it contributes to famine, how it causes desertification, how it contributes to lowering standards of living etc (D4/2/1)

- Embracing all subjects, a global approach. One gets bits and pieces of all subjects i.e. Mathematics, Biology, Geography etc (D4/2/2)
- Teaching in totality i.e. every issue in the environment should be touched on (E5/3/1)
- An approach which views EE in its entirety i.e. not dealing with specifics but dealing with general issues and knowledge. Nothing left out - every aspect to be considered (E5/3/2)
- EE is not part of a discipline, but a complete whole - rather than part of another discipline (E5/3/3)
- EE should bring in other disciplines (F6/2/1)
- EE should cover every topic (F6/2/2)
- EE should be taught in its totality. No aspect of it should be left out (G7/2/1)
- Everything together. All aspects to be considered (G7/2/2)
- Environmental education must affect the learner in his total aspect i.e. emotionally, physically and intellectually (H8/3/1)
- As opposed to compartmentalisation. Not interested in parts but in the effect of the sum total of the parts functioning together (H8/3/2)
- It does not concern itself with specific aspects only (H8/3/3)

Responses:

Integration

- Mixed with other subjects, but not necessarily incorporating everything (A1/1/1)
- EE should be interconnected with other disciplines (B2/2/1)
- I do not know (B2/2/2)
- I am not sure (C3/3/1)
- The same as multidisciplinary (EE should not be confined to the approaches/methods of a particular subject discipline) (C3/3/2)
- I do not know (C3/3/3)
- Incorporating relevant subjects into EE e.g. Biology, Religious Studies, General Science, etc (D4/2/1)
- The inclusion of a subject or parts of a subject into another subject (D4/2/2)
- Bringing other subjects into EE or taking EE into other subject disciplines (E5/3/1)
- Linking EE components to various disciplines as an entity (E5/3/2)
- Bringing knowledge to a whole i.e. bringing all knowledge from other subject disciplines together to impact on EE (E5/3/3)
- EE should bring in other subject disciplines (F6/2/1)
- EE should be incorporated into every school subject (F6/2/2)
- EE should be part of every subject (G7/2/1)

- EE should be included in all subjects G7/2/2)
- EE must be taught together with other subjects i.e. a line of distinction should not be drawn between EE and other subjects (H8/3/1)
- The objectives, content and methods of EE should be introduced into other subjects. That is EE objectives should rank alongside those of traditional school subjects (H8/3/2)
- It involves the development of the "whole" human being (H8/3/3)

Responses:

Trans-disciplinary

- This means from one discipline to the other i.e. the interconnectedness of one discipline to the others e.g. EE and History; EE and Biology; EE and Geography (A1/1/1)
- Cutting across the other disciplines (B2/2/1)
- I do not know (B2/2/2)
- EE across all subject disciplines (C3/3/1)
- Going beyond the set boundaries of a particular discipline i.e. add on to the aims and objectives of the subject (C3/3/2)
- Used in different disciplines (C3/3/3)
- EE across all subject disciplines (D4/2/1)
- I am not sure (D4/2/2)
- Same as (V) in question 9 (EE should be used to link all subjects) but not so rigidly structured (E5/3/1)
- EE should not be seen as linked to a particular subjects e.g. in this college, EE is associated with Geography. But this should not be the case. It should be associated all with other subjects, in fact, all subjects (E5/3/2)
- Putting EE across subject areas in which some one was not aware of or familiar with (E5/3/3)
- EE linked to other disciplines (F6/2/1)
- EE should be across all school disciplines (F6/2/2)
- Stretching EE across all subjects (G7/2/1)
- EE across all disciplines (G7/2/2)
- It is an overlapping subject. It overlaps into the scope the domain of study of other subjects (H8/3/1)
- Across subject disciplines i.e. a superimposition of EE over subjects such as Chemistry, Physics, etc (H8/3/2)
- It is common in all disciplines (H8/3/3)

Responses:

EE across the curriculum

- EE should be in every subject taught at school (A1/1/1)
- Every subject discipline should be related to the local environment (B2/2/1)
- I do not know (B2/2/2)
- I am not sure (C3/3/1)
- As in number (ii) (To view the environment in its totality. Every aspect of knowledge that has a bearing on life and the environment) (C3/2/2)
- I do not know (C3/3/3)
- EE across all subject disciplines (D4/2/1)
- I am not sure (D4/2/2)
- EE to be taught in all the school subjects. This suggests that the curriculum will have to be structured to accommodate this structure (E5/3/1)
- This means EE is to be taught in various disciplines within a school setting. No one of the terms above captures all the essential ingredients, intents and purposes of EE. A combination of these terms might give a proper picture of what EE should be about (E5/3/2)
- Intended outcomes of learning should include EE objectives (E5/3/3)
- EE should be taught in every subject at school (F6/2/1)
- Same as above (EE should be across all school disciplines (F6/2/2)
- Same as above (EE should stretch across all subjects (G7/2/1)
- Same as above (EE across all disciplines (G7/2/2)
- Teaching other subjects through EE e.g. teaching English comprehension using passages which deal with environmental issues (H8/3/1)
- Same as transdisciplinary. Transdisciplinary is at micro-level whilst across curricular is at macro-level (H8/3/2)
- It is learnt every time, everywhere (H8/3/3)

APPENDIX 2^B QUESTIONS 11-22

Question: 11

Do you agree with the opinion that EE should be taught from an interdisciplinary perspective?

Responses:

YES ≡ . . . **14**

Note: All other respondents answered "Yes" but without further comment.

- Everybody should know EE not just those students who are studying EE (A1/1/1)
- It helps to improve comprehension of learners. It affords continuity, it helps to indicate that knowledge is holistic, that disciplines are not meant to see knowledge only from a particular perspective (B2/2/1)
- An interdisciplinary approach is a good way to teach EE (C3/3/1)
- Because EE is general in its approach (C3/3/2)
- The basic reason will be that the school curriculum is overloaded. Hence no need to introduce a new subject. If EE were a subject, it would end up as any other discipline and then its life giving mission would be lost. EE will reach a broader population if it is taught across the curriculum (H8/3/2)
- B2/2/2 did not answer the question.

Responses:

NO ≡ . . . **2**

- Lecturers must have a thorough knowledge of EE otherwise they tend to ignore environmental issues in their subject area (D4/2/2)

QUESTION 12

Question:

Do you find it possible to teach EE from an interdisciplinary perspective?

Responses:

YES = . . . **8**

Note: B2/2/2 does not answer the question

- It shows how other subject disciplines are related to EE e.g. geography and EE (A1/1/1)
- Ref. to answer to question 8 : Mapping out within various disciplines of concepts which are interrelated, showing relationships of one subject area to and others (B2/2/1)
- B2/2/2 does not answer the question

- For example in Geography, one must explain how politics is related to environmental problems (C3/3/3)
- Ref. to question 8 for answer : A holistic approach to specific topics and skills related to other disciplines should be incorporated into EE e.g. atmospheric pollution, ozone depletion, etc. Some disciplines are more related to EE than others (D4/2/1)
- Subject based curriculum is geared towards examinations. So there is need for curriculum content and evaluation to be changed to reflect and accommodate interdisciplinarity (E5/3/1)
- It depends on the topic to a large extent. One tries to relate topics in one area to the other i.e. air pollution and how it is influenced by Chemistry, Economics and Bio-geography (H8/3/1)
- When explaining an environmental aspect, I would consider its economic, social, mathematical and historical effects (H8/3/3)
- Yes, concepts to be learnt bring about the relationship between say Geography and EE (E5/5/5)

Responses:

NO = . . . 9

- To be honest I have not taught EE as such. May be the reason is that the college system is examination orientated and lots of other things are dependent on this. For example, lecturers have to give a written account of why students failed in their subjects. The people in the curriculum division will have to design a whole interdisciplinary curriculum for colleges in order for this to work properly (C3/3/1)
- Presently no. This approach is not so clear and it does not fit properly into the general course structure of the college (C3/3/2)
- There isn't much chance for a teacher (lecturer) to explore all the issues thoroughly. A teacher might not be knowledgeable enough in some aspect which relates to other subject areas (D4/2/2)
- There is no time for it and I am not trained in it (F6/2/1)
- Because college curriculum does not allow this to be done. Besides, the course itself seems to be discipline inclined (G7/2/1)
- Time does not allow this to be done (G7/2/2)
- The existing college structure (i.e. timetable, examinations, finance, social set up and lecture hours) do not allow this to be done (H8/3/2)
- F6/2/2 answers just "No" without further comment

QUESTION 13

Question:

Do you think a possible difference exists between a subject based curriculum and an interdisciplinary approach to EE as in colleges? If so, does this pose any problems to college lecturers?

Responses:

Note: One of the respondents does not answer the question.

YES = 11

- Yes, there is. This might pose problems because it is not incorporated into the syllabus. The syllabus is stiff and structured and compartmentalised. The Institute of Education and the Curriculum Planning Division of the Department of Education should take the initiative to change this (A1/1/1)
- Yes. It does pose a problem in the sense that there is no uniformity and this is a waste of time because a unified curriculum would improve learning (B2/2/1)
- B2/2/2 does not answer the question.
- Ref. to answer to question 12: The people in the curriculum division will have to design a whole interdisciplinary curriculum for colleges in order for this to work properly (C3/3/1)
- There is a problem. There are no teachers (lecturers) who are trained or who are specialists in EE approaches (D4/2/1)
- Yes. To a certain extent but it is necessary for the whole college curriculum to be structured on an interdisciplinary basis (E5/3/1)
- Yes, there is a problem. Subject based discipline resist the innovative stance of EE. Unless an individual has done a course in Geography (E5/3/3)
- Yes there is. Many of our colleagues just use old and familiar methods of lecturing and they fail to understand the whole purpose of environmental education (F6/2/1)
- The approaches of environmental education are unique but lecturers are not trained in these approaches. We are used to the traditional methods of lecturing (F6/2/2)
- Yes, there is conflict while courses at college are taught as disciplines and are highly regarded by students and other lecturers, EE methods seem to be unclear and therefore students and some lecturers do not take it seriously (G7/2/1)
- Yes, other subjects in the college are taught on their own. EE is taught through all others (G7/2/2)
- Yes indeed. To some lecturers, the introduction of EE approaches seem to make their subjects to be overshadowed and old fashioned. Most college lecturers are not trained so there is a problem. There isn't enough time for those EE approaches to be practised (H8/3/2)

- Yes, but excluding those who are capable and aware of the incorporation of EE (H8/3/3)

Responses:

NO = . . . 5

- No, not to lecturers but it does pose a problem to students (C3/3/2)
- No, there is no problem because Geography is closely related to EE. But in cases of subjects which are not so closely related to EE, the teacher (lecturer) might find it a problem (D4/2/2)
- No, there is no problem. Maybe it is a problem to non-environmental education lecturers, but not to those who teach environmental education (E5/3/2)
- C3/3/3 just answered "No" without any comment
- H8/3/1 just answered "No" without further comment

QUESTION 14

Question:

Do you think that it poses problems for teachers in schools?

Responses:

YES = 15

- Same as in colleges (might pose problems because it is not incorporated into the syllabuses (A1/1/1)
- There certainly will be problems because of stereotypes in the school system (B2/2/1)
- B2/2/2 does not answer the question
- They will have problems because this is not done at college by college lecturers. Students at college study EE only in the EE class for three periods a week (C3/3/1)
- The problem will be with schools because the learners are much younger. There is also not much time to accomplish this (C3/3/2)
- They are more likely to view EE as a discipline. EE lecturers at college level use the traditional method of teaching (D4.2.1)
- Yes (same reason as above) i.e. subject based curriculum is geared towards examinations. So there is a need for curriculum content and evaluation to be changed to accommodate interdisciplines (E5/3/1)
- With the present structure of the schools, the teachers are likely to encounter problems (E5/3/2)
- It sure will, because they are supposed to teach EE through other school subjects and yet teachers are not being taught to do this at college (F6/1/1)
- Yes, they do not know how to do it - they are not trained to do this (G7/2/2)

- There will be a problem i.e. resistance from principals, colleagues. The timetable will militate against it. College students have just studied these things in theory - they have not had any practice (H8/3/2)
- Yes (H8/3/3)
- Yes, without further comment (C3/3/3)
- Yes, without further comment (F6/2/2)
- Yes, without further comment (G7/2/1)

Responses:

NO = 2

- No, not much of a problem because they will be familiar with EE approaches (E5/3/3)
- No, without further comment (H8/3/1)

QUESTION 15

Question:

What would you say is the perception of your students of the interdisciplinary nature of EE?

Responses:

- Students enjoy it because they find EE to be related to other subjects (A1/1/1)
- Students are used to compartmentalised curriculum so they find it difficult to adjust to the new approaches. This is because there is no continuity in the curriculum (B2/2/1)
- B2/2/2 does not answer the question
- It is not clear to our students what this whole idea of EE is about. It is their first semester and they are still trying to find their way (C3/3/1)
- Students seem to be understanding the whole idea of EE being interdisciplinary (C3/3/2)
- Fair (C3/3/3)
- Students have come to realise that EE is related to other subject disciplines. They appreciate their involvement in EE (D4/2/1)
- Students feel that EE should be a subject on its own so that they can teach it in schools (D4/2/2)
- They find it interesting but tedious to fish for information from other disciplines because they are accustomed to looking for information in one textbook (E5/3/1)
- Students do not find it a problem but they might when they go into the teaching field and have to put it into practice (E5/3/2)
- Quite a number of students appreciate the approach (E5/3/3)
- They think it is a wonderful idea but I am sure they do quite know what it is (F6/2/1)

- They find it exciting but I do not think they really understand what is entailed in this (F6/2/2)
- They love it but find it difficult to practice (G7/2/1)
- They find it exciting (G7/2/2)
- They find it interesting (H8/3/1)
- Their reaction is mixed. Some think it is interesting and challenging. Others think it is overburdening and difficult - they are set in the traditional mould (H8/3/2)
- They find it time consuming (H8/3/3)

QUESTION 16

Question:

How does the way the college is organised affect the implementation of EE in the college?

Responses:

- Fewer outdoor opportunities. This aspect should be incorporated into the syllabus. Students are not able to involve themselves in the community projects therefore they are not involved in problem solving. Outdoor projects should be evaluated and made part of semester evaluation (A1/1/1)
- Periods are poorly allocated - EE periods should be the last periods of the school day so that the lecturer can extend it if he wishes to do practical work. Number of periods for EE are too few - i.e. 3 per week. Suggested number is seven (B2/2/1)
- B2/2/2 does not answer the question
- The periods are few i.e. two forty minute periods. This is too scanty given that one has to do practical work. Again EE at this college is not even an ancillary. It is termed as an enrichment course, so the status is low and students as a result do not regard it as a serious course (C3/3/1)
- The time table is too restrictive - it does not allow for outdoor excursions and exchange of ideas. There are only 2 periods per week for EE (C3/3/2)
- The time table does not allow enough time for field work (C3/3/3)
- The three period week allocated to EE is sufficient (D4/2/1)
- Periods are few i.e. 3 periods a week. This affects the effective completion of the syllabus. Environmental education is more theoretical than practical (D4/2/2)
- The nature of the time table (3 periods a week en block) is problematic. I have seen my students only three times in a whole semester. There should be a separation of periods i.e. two periods before break and another one after break. Periods should be split among different days of the week (E5/3/1)

- EE is lumped together with other ancillaries e.g. Librarianship and Guidance and Counselling which require three periods running. It would be more desirable if there was a practical component to EE. It would be best if this practical component was a continuous process which includes community projects, tree planting, recycling, cleaning exercises, checking erosion, etc (E5/3/2)
- The time table is the problem. EE is time-tabled three continuous periods a week. EE alternates with Geography on the examination time table and this does not give students adequate time to concentrate and revise EE because EE students are also geography students (E5/3/3)
- EE just does not fit in here. Time table is rigid. There is too much bureaucracy such that a lecturer finds it difficult to arrange for an outing or a trip with students. Before one succeeds in negotiating there will be no time left to undertake the trip (F6/2/1)
- There are too many interruptions in the college programme and therefore we do not find the time to do all there is to be done in environmental education i.e. going into the community to identify problems and solve them (F6/2/2)
- The time table does not allow for practical work and community involvement. Examinations are all written and there is no practical work (G7/2/1)
- Inflexibility - everything is rigid and examination orientated (G7/2/2)
- EE is based on the environment not in the class room but insufficient time is allocated to EE. Seven periods a week should be adequate. Evaluation should be based on practical work as well (H8/3/1)
- Time table is too rigid, it does not allow one to experiment. There is too much bureaucracy. Students are not given a chance to practice EE approaches (i.e. in their crits) they just use traditional subject methods. Examiners seem not to be informed - they do not seem to have any training in EE approaches. Their questions are not in line with EE approaches. There is not much time on the time table for students' participation in lesson, problem solving and community involvement. (H8/3/2)
- The time allocated for EE does not allow for its proper implementation. (H8/3/3).

QUESTION 17

Question:

Do you or other college lecturers experience any other problems in teaching EE? .

Responses:

- No. (A1/1/1)
- No. (B2/2/1)
- B2/2/2 does not answer the question

- Finance is also a problem - certain projects cannot be undertaken. Budget allocation is for Geography and Environmental Education takes up all the funds (C3/3/1)
- We are not quite sure of how to implement some of the EE approaches e.g. democracy and problem solving (C3/3/2)
- There is not enough time allocated for EE (C3/3/3)
- Yes, I find problems with teaching EE through other subjects (D4/2/1)
- No (D4/2/2)
- No (E5/3/1)
- Yes there is not enough time to do all the things that are required in EE i.e. outdoor projects and community involvement (E5/3/2)
- No (E5/3/3)
- No (F6/2/1)
- No (F6/2/2)
- No (G7/2/1)
- No (G7/2/2)
- No (H8/3/1)
- No (H8/3/2)
- Number of periods do not allow us to demonstrate the interdisciplinary nature of EE (H8/3/3)

QUESTION 18

Question:

How serious do you consider these problems?

Responses:

Very serious 7

Fairly serious 8

Not serious 1

- Not applicable (A1/1/1)
- No response (B2/2/2)
- Fairly serious : especially shortage of periods which militate against practical application of EE knowledge and skills. There is no correlation between theory and practice (D4/2/2)
- Very serious : there is a need for more focus on EE. The time table must change. The college day must also be flexible (F6/2/2)
- Very serious : the fate of EE is at stake (H8/3/2)

QUESTION 19**Question:**

Can you make any recommendation as to how the problems you mentioned can be overcome?

Responses:

- Not applicable (does not encounter any problems) (A1/1/1)
- The number of periods for environmental education should be increased from three to seven. Examinations should not only be based on written work, it must include practical work also. This change in evaluation is important because it could result in a useful ripple effects for in EE (B2/2/1)
- B2/2/2 does not answer the question
- Unless educational planners and administrators realise the importance of EE, it will be regarded as in insignificant course by students and EE implementation and all the attendant problems will remain (C3/3/1)
- Course lecturers should be involved in drawing up of the time table (C3/3/2)
- The three periods allocated for EE should be structured as double periods and singles (C3/3/3)
- The three periods are adequate. There are no other problems (D4/2/1)
- There should be seven periods per week instead of the current three so as to enable teachers and students to undertake practical work and field excursions (D4/2/2)
- The periods should be split amongst days of the week e.g. two periods in a single day and one period on another (E5/3/1)
- It is proper if the periods are separated. Students do not take EE seriously because it is an ancillary subject. If EE were to be come a major course of study at the colleges (as proposed by the institute of education for implementation in 1993) more students will take it seriously (E5/3/2)
- EE periods should be properly allocated on the college time table - the current three periods en block is not satisfactory. The three periods are inadequate — maybe five periods a week would be a good idea (E5/3/3)
- There is a need to bring the whole college curriculum and structure in line with the demands of practical and relevant education which is what EE stands for (F6/2/1)
- College authorities need to be made to understand the importance of EE. There should be in-service training for all teachers (F6/2/2)
- College time table should be flexible. Other subject disciplines must be interdisciplinary as well (G7/2/1)

- There is a need for more flexibility. More time should be allocated to EE. Lecturers should have the freedom to experiment. Evaluation should not just be written, a practical component should be included (G7/2/2)
- EE is based on the total environment not just the classroom. As a result, the number of periods allocated to EE is not adequate. Seven periods per week would be ideal. Evaluation should also be based on practical work and not just on written examination. Examination centredness defeats the whole purpose of EE (H8/3/1)
- There should be 9 periods per week allocated to environmental education. The time table should be flexible. Examiners should be people well versed in environmental education approaches. Examiners must set examination questions that are based on environmental education principles (H8/3/2)
- At least EE periods should stretch for 2 hours at a time in order to allow for its proper implementation (H8/3/3)

QUESTION 20

Question:

Are any of these problems related to the difference between the interdisciplinary nature of EE and subject based college curriculum?

Responses:

YES = 9

- does not see any problems (A1/1/1)
- B2/2/2 does not answer the question
- This is because many people fail to realise that there is a vast difference between environmental education approaches and those of other subject disciplines (D4/2/2)
- This is because people see EE as mainly a clean up campaign and an outdoor activity (E5/3/1)
- This is because EE is not a major subject in the college. Hence the attitude of college staff and administration towards EE is not different from that towards other ancillary subjects (E5/3/2)
- It would be best if EE periods were always the last on the time table so that some outdoor activities can be undertaken without fear of disrupting other periods (E5/3/3)
- There is a conflict between the established system and EE which is new and different (F6/2/1)
- The problem is that people do not understand what EE stands for (D6/2/2)
- Yes there is a relationship. EE approaches require more time, flexibility and independence than the traditional disciplines (H8/3/2)

- Because the teaching is more exam orientated and when one looks forward to implementing EE, the time factor does not allow (H8/3/3)

Responses:

NO = 3

- but holistic nature of EE and subject based college curriculum (C3/3/3)

Responses:

NOT SURE = 6

QUESTION 21

Question:

How successful do you rate the implementation of EE in your college?

Responses:

Very successful = . . . 0

Successful = . . . 4

Average = . . . 6

Not successful = . . . 7

Poor = . . . 1

Note B2/2/2 does not answer the question.

- We invite outside experts to seminars to enlighten our staff on environmental issues. The main constraint we have is shortage of periods (D4/2/2)
- Lecturers are not trained for EE. First year secondary students are left out of the EE course because of shortage of teaching staff (E5/3/1)
- On paper it might look successful because EE students pass their examinations very well, but it is doubtful if their attitudes are positively impacted upon by their study of EE. It is also doubtful whether the practice of EE conforms with guidelines of the Tbilisi Declaration and Belgrade Charter as well as the World Conservation Strategy (E5/3/2)
- We are struggling to get properly organised (G7/2/1)

QUESTION 22

Question:

Would you like to make any other comments with specific reference to the interdisciplinary nature of EE at college or school level?

Responses:

- No comment (A1/1/1)
- Co-ordination between college campus programmes e.g. cleaning up campaigns, gardening, tree planting, checking soil erosion etc and those of other non-governmental organisation would be a great asset to the EE program. Student should be involved in the co-ordination exercise i.e. planning and execution (B2/2/1)
- B2/2/2 does not answer the question
- No comment (C3/3/1)
- No comment (C3/3/2)
- No comment (C3/3/3)
- No comment (D4/2/1)
- EE should be taught as a discipline both at college level and at school level because once taught interdisciplinarily students tend to be reluctant to study the course e.g. outdoor activities are seen as a waste of time. This is because they are non-examinable (D4/2/2)
- No comment (E5/3/1)
- The aims of EE will be best achieved if all the students in the college had an opportunity to study EE. In my opinion the current 3 year programme could very well be covered in one year. If this were the case, it would give every student an opportunity to study EE at one time or the other during their stay at the college (E5/3/2)
- No comment (F6/2/1)
- No comment (F6/2/2)
- College curriculum must conform to the internationally accepted principles (G7/2/1)
- No comment (G7/2/2)
- Lecturers who teach EE should be fully trained - even if this only means some kind of intensive in-service training. This could happen say twice a year (H8/3/1)
- No comment (H8/3/2)
- Aspects which are found to be common in other disciplines need to be integrated so as to save time and give more time for true implementation of EE (H8/3/3)



NOVEMBER EXAMINATIONS 1992

SUBJECT : CSPEN 120
COURSE : PRIMARY, SECONDARY & EARLY LEARNING
TOTAL MARKS : 100
CHIEF EXAMINER : N. RUTHNAM

MARKING MEMORANDUM

MARK ALLOCATION

QUESTION ONE : TRUE/FALSE 10
QUESTION TWO : CLOZE 10
QUESTION THREE : INTERPRETING GRAPHIC
INFORMATION 20
QUESTION FOUR : ESSAY 60
TOTAL 100

QUESTION ONE

- 1.1. F
Ozone is formed from oxygen through the action of the sun's light on the upper atmosphere.
- 1.2 F
Ozone absorbs the ultra-violet radiation from the sun.
- 1.3 T
- Without the ozone layer, life as we know it would be impossible.
- Without the ozone layer animals would be blinded and there would be extensive skin cancer.
- Either one of these explanations would be acceptable.
- 1.4 F
It has more to do with people trying to get a suntan.
- 1.5 T
Ozone from elsewhere can enter and be destroyed.

5 x 2 = 10 MARKS

QUESTION TWO

1. denied, refused
2. cargo, load
3. poor
4. one
5. environment
6. to
7. away
8. enough
9. waste
10. countries
11. methods
12. have
13. demands
14. regulations, laws, rules
15. countries
16. too
17. because
18. highly, very
19. to
20. been

Kindly use your discretion when marking this question. Students will often use words which would be different from the answers suggested, but which are quite acceptable.

20 x $\frac{1}{2}$ = 10 MARKS

QUESTION THREE

3.1 The destruction of forests and other habitats.

3.2		1960	2010
3.2.1	N. America	200m	310m
3.2.2	Africa	290m	1150m
3.2.3	W. Europe	430m	510m
3.2.4	Latin America	220m	630m

(4)

- 3.3 (a) Less developed areas are poorer and have greater populations increases.
 (b) Less knowledge about and access to contraceptives and information about contraceptives.
 (c) Poorer areas rely on having many children - to help fend for the family. (2)

3.4 Kindly check the Text. There are nine major man-made environmental incidents. (2)

3.5		1960	1987
	U S A	783.7	1224.0
	U S S R	389.9	1013.6

(2)

3.6 The USA in highly industrialized and consumes huge quantities of fossil fuels.

- 3.7 (a) The world could be faced with global warming.
 (b) The supply of fossil fuels could be depleted. (2)

- 3.8 (a) Industrialized countries consume more and have much more to throw away.
 (b) What is considered garbage in industrialized countries is often not garbage in developing countries and is not thrown away. (3)

QUESTION FOUR

Kindly refer to Page 22 of Write and Learn for a guide to marking the essays.

APPENDIX 4

REPORT ON THE NEEDS ANALYSIS WORKSHOP HELD
ON 20-22 OCTOBER 1993 AT PILANESBERG
BOARDROOM.

DAY ONE

1.1 Syllabus analysis and evaluation Year 1

The workshop began in earnest although only four colleges (Mankwe, Hebron, Thaba Nchu and Taung) were represented. However the proceedings were nearly bogged down by the confusion surrounding which syllabus to use at the first year level for primary and secondary. This emanated from the fact that in the past years there was one syllabus for both groups. But since the primary students do Environmental Education at first year only whereas the secondary carry on for three years, two different syllabi were drafted. Since there were areas of commonality, it was therefore agreed to treat the Primary I and Secondary I on simultaneously.

What happened was that the syllabus was analyzed by calling for individual conception on different topics and then these were bridged to a common interpretation. Hence forth followed the chronological arrangement of the resource file in relation to the syllabus topic sequence. This process also applied to the syllabus analysis at subsequent levels.

In evaluating the syllabus it became clear that the Primary I was too compressed in a short period of time i.e. one year.

DAY TWO 21/10/93

On this day the number of colleges represented increased to six with the exception of Lehurutshe and Moretele.

2.1 Environmental Education Approach : A critical assessment

The presenter Mr Akwa from Tlhabane college explored the nature of the present curriculum approach, and traced the History of learning as a way to determine where the Environmental Education Approaches can be placed in the compartmentalised discipline framework. An allusion was made to the guiding principles and a question arose that why should they be peculiar to E.E. and not other disciplines.

However the guiding principles were explicitly explained and inherent in that was how to implement the objectives to achieve such aims. It was also acknowledged that some of the guiding principles have short comings, for instance, learner involvement.

2.2 Theatre and Environmental Education teaching : Theatre for Africa.

This session proved the best answer to Learner involvement in the sense that it involves the students in their own learning. Theatre is good since it does not require huge financial resource when conducted in the open environment. Theatre for Africa enlightened participants on how to recreate or how to mimic both the natural and artificial phenomena. The participants were provided with the opportunity to create own Acts and Scenes on different environments.

2.3 Exams and Examiners : towards a reconciliation

During his presentation Mr Lehobye provided some background information on Environmental Education Syllabus. He stated that E.E. had been an ancillary over three years for both Primary and Secondary. It was then realised that primary school teachers had to teach all subjects and hence the need for all primary students at college to do Environmental Education at Year 1 according to Mr Lehobye who is also the examiner. A new curriculum allowing teachers to teach all subjects at primary school level also came into being.

An observation hinted to earlier that there is confusion with which syllabus to use i.e. (P) Primary, (S) Secondary and (P+S) Primary and secondary was brought to the attention of the examiner.

Furthermore the lecturers expressed dissatisfaction that no memo had been sent on which syllabus to use. Moreover the timetable at colleges lumps both primary and secondary as one thing at one the same time.

In response the Examiner made it known that he does not draw the syllabus but is only invited and in that case he had never been invited to such panel. As a result he had been left with no alternative but to use the concept papers submitted to him by the colleges. To make things a bit easier for all groups to cope matching questions were preferred rather than definitions, Mr Lehobye said. To illustrate lack of consultation he referred the house to the standard 1 and 2 Environmental science syllabus which is very much divorced from what the College Primary Syllabus. The question is therefore how are the student teachers going to cope in the field?

To correct the wrongs it was unanimously resolved that another workshop be convened after consultation with the relevant authorities to revisit the issue. Mr Monye was delegated to consult with the authorities in his capacity as the chairman of E.E. subject panel.

2.4 CUE

The CUE centre according to Wilf Slade aligns itself to the commonly accepted philosophical background of Environmental Education. CUE strives to expose teachers to E.E. approaches such as problem solving skills, creative holistic thinking, decision making and in turn these lead to aesthetic appreciation. Mr Slade mentioned that CUE is a joint venture between the Education Department, Bop Parks and Unibo.

According to Wilf the syllabus is not the enemy but the subject is and therefore teachers should be empowered on how to use the environment to enhance their teaching.

2.5 Video Assessment

In assessing the video "The End of Eden" the participants were divided with some feeling that it was culturally biased, too long and therefore unsuitable for use as a resource. Whereas others felt it could be adapted and portions could be useful for specific aspects or topics. However it was resolved that those who wish to use the video in their teaching should do so.

Day three - 22/10/93

3. Syllabus analysis Year 2 and 3

The same procedure as in Year 1 Primary and secondary was followed.

3.1 Suggestions:-

Mr Monye suggested that a request be sent for semester meetings where a common goal in the form of content to be covered by all colleges be set out to avoid a situation whereby two or more colleges are doing something different for a common exam. Mr Botolo qualified the suggestion and added that such workshops should be on a rotational basis between all colleges.

3.2 RECOMMENDATIONS

The need for another workshop of this nature was overemphasised and once more an appeal was made to the Parks Board to assist with facilities at Pilanesberg for a workshop that is to run on the 1/12/93.

Furthermore Mankwe Christian is to be approached to accommodate participants for at least two nights i.e. 30/11/93 - 1/12/93. Rectors of all colleges to be consulted about the compulsory workshop to be attended by E.E. lecturers.

3.3 Closing Remarks :-

Mr Kgatitsoe extended his gratitude to all the participants who had contributed to make the workshop a success and also appealed to the lecturers not to personalise the resource material they had acquired but to share the information with their colleagues. He ended by wishing all attendants a safe journey back to base.

3.4 Vote of Thanks

On behalf of the lecturers Mr Vilakazi expressed how impressed he was after participating in an eye opening workshop and wished that more workshops of this nature could be conducted since they are very enriching as well as informative. He above all thanked the Bop Parks for the contribution it has made to the development of E.E. in the country.

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Pilanesberg National Park
Bophuthatswana

9 NOVEMBER 1993

H.C.D. Environmental Education
Mabane College of Education
Private Bag 12003
Mabane
Sir/Madam

RE : INVITATION TO ATTEND A WORKSHOP

It is a pleasure to inform you that a follow up needs analysis workshop will be held at Pilanesberg National Park on the 1st of December 1993 at 09h00.

This will be a one day workshop. It will be held at Goldfields Education centre at Pilanesberg National Park. All colleges are requested to send (2) environmental education lecturers to the workshop. All lecturers are expected to bring along their syllabuses.

Accommodation and meals will be provided to all participants including the institute of Education and the 2 examiners. Delegates who would like to overnight the 30th and the 1st will be accommodated at Mankwe Christian College and they should report at the college before 18h00 on the 30th of November. All delegates are expected to bring their own beddings.

The purpose of the workshop will be three fold :

- * To round off issues which emerged in the October workshop.
- * To assess the validity of the question papers in relation to the expectations of the examiners visavi the syllabuses.
- * To eradicate all discrepancies that exist interms of different syllabuses used for different levels.

At the end of the workshop material will be provided to the present delegates to upgrade their files (resource) and also video material will be circulated to the colleges which identified that need in the previous workshop.

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TERTIARY EDUCATION UNIT

NEEDS ANALYSIS WORKSHOP

1ST DECEMBER 1993

VENUE : GOLDFIELDS EDUCATION CENTRE :
PILANESBERG NATIONAL PARK

TIME : 09H00

1. ARRIVAL
2. WELCOME AND INTRODUCTIONS
3. WORKSHOP SESSION 1 :
Round off and report on issues which emerged from the October workshop.
4. TEA BREAK
5. WORKSHOP SESSION 2 :
A reconciliation of the examiner and syllabus expectations :
A special emphasis on examinations.
6. LUNCH
7. WORKSHOP SESSION 3 :
Syllabuses : for confusion or for clarity? : An overview of the existing syllabuses and future plans.
8. TEA BREAK
9. WORKSHOP SESSION 4 :
Resource materials and miscellaneous
10. CONCLUDING REMARKS
11. VOTE OF THANKS
12. DEPARTURE



APPENDIX 7**GUIDING PRINCIPLES FOR EFFECTIVE ENVIRONMENTAL EDUCATION AS ADOPTED AT THE 1977 INTERGOVERNMENTAL CONFERENCE ON ENVIRONMENTAL EDUCATION HELD AT TBILISI, USSR**

Environmental education should:

- consider the environment in its totality - natural and built, technological and social (economic, political, cultural-historical, moral, aesthetic);
- be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages;
- be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
- examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas;
- focus on current and potential environmental situations while taking into account the historical perspective;
- promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems
- explicitly consider environmental aspects in plans for development and growth;
- enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences
- 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;
- help learners discover the symptoms and real causes of environmental problems;
- emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;
- 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.