TEACHING THE PRINCIPLES OF ECOLOGY IN THE URBAN ENVIRONMENT: AN INVESTIGATION INTO THE DEVELOPMENT OF RESOURCE MATERIALS

THESIS

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ABSTRACT

The combined potential of two crucial factors in 1993, which afforded the promotion of socially just and ecologically sustainable ways of living, led to the instigation of this research project. The first was the imminence of our first democratic election; the second was the possible introduction of environmental education into formal education. In the light of these momentous shifts, it became apparent to me that teachers would have to radically transform their practices in order to play their part in transforming society from the dark days of apartheid into one of equity and harmony. The implications of these factors precipitated the falling into place of the rationale for my research: teachers had to look for professional development experiences which could facilitate the creation of alternative ways of thinking and doing.

As a result, I approached a group of biology and geography teachers on the Cape Flats and, after protracted discussions, we decided to examine the potential of the urban environment for the teaching of ecology from the perspective of socially just and environmentally sustainable living. Out of this decision was born this study, which aimed at examining whether this process could, as a means to professional development, be a 'moment' in our journey to becoming transformative intellectuals. From this aim, the central research question emerged:

Can emancipatory action research play a role in empowering teachers to become transformative intellectuals?

The study consisted of five stages:

- exploring the problem by reviewing the literature on the research problem;
- the semi-structured interviews;
- five workshops;
- the 'sensing the urban environment' fieldtrip; and,
- the various evaluation sessions.

What we achieved during this research project, firstly, was a better understanding of our practices, which led us to seeing our roles as teachers differently and altered our pedagogical approaches. Secondly, this process developed the belief within ourselves that we, as teachers, can and should make a difference to the educational world in which we live. Lastly, this process laid the foundation for continued collaborative action by the participants.

This process taught us that educational transformation is difficult and painful, and that present educational structures are not conducive to change. Nonetheless, in the historical context of this research, emancipatory action research was successful in giving us a consciousness-raising experience and closed the rhetoric-reality gap as we engaged in praxis (the practitioners developing and implementing their own curriculum).

If we, as transformative intellectuals, are to engage in intellectual labour in the future, we are not only going to need to change our way of thinking and doing but will have to create an enabling infrastructure to realise this as well. We will, in addition, have to change the structures of the institutions in which we work in order to practise as transformative intellectuals.

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CHAPTER ONE

NAMING THE PROBLEM

To the oppressed and
to those who suffer with
them and fight at their side.
Freire (1972:1)

1.1 Introduction

This study emerged from my "lived experience" (Malone 1993:20) as a teacher on the Cape Flats of Cape Town, who suffered under the apartheid regime as a 'non-citizen' in the land of my birth. The statements of Hartzenberg (1980) and Verwoerd (1953) quoted in Christie (1991:12) epitomised the unjust educational policy of apartheid education that was part of my daily life as a pupil and later as a teacher:

> Educational policies in South Africa must be dictated by the apartheid philosophy.
> F.Hartzenberg (1980)
> Minister of Education and Training

> When I have control over native education, I will reform it so that natives will be taught from childhood that equality with Europeans is not for them.
> H.F.Verwoerd (1953)
> Minister of Native Affairs

In this context, as a teacher, I wrestled with an internal conflict which arose from the contradiction between the role that my teaching practice played in maintaining the political status quo on the one hand, and my public protests against the unjust laws of the country, on the other. This contradiction led to an anguished concern about not only how I was teaching but also what and why. Freire's observations highlighted the former aspect -

the 'how' of my teaching - of the dilemma in which I found myself:

> ...What kind of politics am I doing in the classroom? That is, in favour of whom am I being a teacher? The teacher works in favour of something and against something. Because of that, he or she will have another great question, How to be consistent in my teaching practice with my political choice? I cannot proclaim my liberating dream and on the next day be authoritarian in my relationship with the students (quoted in Angelis & Robinson, 1989: 164).

As a Biology teacher in 1992, my concerns about the 'what and why' of my practice found resonance in Meerkotter and Van den Berg's (1994a) contention that the current school curriculum is largely irrelevant to the daily lives of the community it purports to serve. I consequently had the vague notion that teachers had to have a greater say in the shaping of the curriculum so that it became more relevant to the communities in which they served. Teachers, too, I felt, needed to have a greater say in school governance. However, I was acutely aware of the appalling training teachers had received under apartheid (Van den Berg 1994) and the manner in which this had disempowered them professionally (Samuel et al 1992).

In 1993, as the new political dispensation loomed on the horizon, the insights of Beyer (1989: 40) on the role of teacher education began to crystallise my thinking as I grappled with these tensions:

> ...the aim [of teacher education] is to develop critically orientated, compassionate and impassioned, reflective and socially engaged practitioners who can aid in the process of *educational improvement* and *social change*; to encourage critical reflection on our own situations and those of our students, our futures, and our social responsibilities, that leads to actions favouring *empowerment of teachers* and a *commitment to democracy, equality and autonomy.* [my emphasis]

Bearing in mind the words of Stenhouse (1975:144) "not in isolation but in collaboration with Colleagues" the challenge for me, therefore, was to find, with fellow teachers who shared these

sentiments, a pathway to develop a reconceptualised role of teachers, as espoused by Beyer (1989) in a rapidly changing South Africa. Teachers, in my view, had to find the means to become professionally empowered to determine, to a greater extent, the 'how, what and why' of their practice. And, in my case, being a Biology teacher, this meant seeking ways to refocus the Biology syllabus, as well as its implementation in schools, so that it more directly addressed the needs of community. For me, the impending political liberty would ring hollow if it did not translate directly into the democratisation of pedagogical practice, as well as into the transformation of the communities disadvantaged and degraded by apartheid. With these growing convictions, the underlying rationale of this study began to take shape.

1.2 **Rationale of the Study**

Reflecting on the role that environmental education could play not only in the transformation of communities but also in the democratisation of social relations, I began to consider the indications that environmental education might constitute a 'core' function in the post-apartheid school curriculum (Naidoo et al 1990; Schreuder 1995) in the light of Robottom and Hart's (1993:vi) contentions related to environmental education:

> As a strategy for educating for a critical perspective on the 'business as usual' approach to development and for changing the social values and structures that support it, environmental education requires its practitioners to follow pathways of education quite markedly different from the ways schooling and non-formal environmental education have traditionally been organised.

For me, two central implications arose. The first pertained directly to the possibility of environmental education being introduced into the formal curriculum in South African schools as a potential means to grappling with the environmental degradation wrought through apartheid, especially on the

communities discriminated against during that era (Wilson et al 1989). In my view, education had to be transformed, with the aim of promoting ecologically sustainable and socially just patterns of living in society (Fien 1992). Related to this was my realisation that such a move would have various implications for us as teachers in South Africa with very little background in environmental education. This realisation gave rise to the second implication: education in South Africa would need teachers to become transformative intellectuals (Giroux 1985), if they were to play a role in transforming South African society in a post-apartheid era. This latter realisation is borne out by the Western Cape Teacher's Union:

> A post-apartheid South Africa will need post-apartheid teachers, able...to reflect critically on the social and cultural forces which shape their lives, and a perception of their ability to change things actively (NECC and UWC 1987:24).

Regarded together, these perceptions that Environmental Education could play a role in promoting sustainable living, and that teachers had to become transformative intellectuals in order to realise the transformation of society, the rationale for this study fell into place. The necessity of discovering the means to re-orientate not only education but also to transform the practices of teachers, became the justification for the study.

In turn, this dual justification, interacting with Robottom and Hart's belief (1993: vi) that teachers need to discover

> professional development experiences and processes that can conscientise [us] to the transformative nature of [our] field and empower [us] to be active, critically reflective practitioners in [our] profession

began to articulate the broad aim of this study: to evaluate, as teachers using emancipatory action research (see section 2.2.2.2) to look at the potential of the urban environment for the teaching of ecology, whether this process could, as a means to

professional development, be a 'moment' in our journey to becoming transformative intellectuals. From this aim emerged the research questions underpinning the study.

1.3 The Research Questions

The central research question which emanated from the aim of the study is: ***Can emancipatory action research play a role in empowering teachers to become transformative intellectuals***? However, since this question comprises various dimensions, these have been formulated into specific research objectives for this study, which seek to discover:

* whether teachers see the need for professional development processes, using the method of emancipatory action research;
* what the barriers that this process has to overcome are;
* what we achieved during this process.

The central research question informing this study, as well as its concomitant objectives, however, need to be grounded within their emanating context.

1.4 The South African Educational Context

The emancipatory agenda of this study makes it necessary to heed the words of Smyth (1987: 2):

> If there is to be any chance of changing the present arrangements in education, it is important to have an understanding of how it came to be.

Collingwood (1956) sheds a tighter dimension on Smyth's contention: he believes that, in addition to knowing about the roots of the education system, much more importantly, we need to know how the various aspects of the past have impacted on the present, if we want to bring about change. These overlapping observations consequently dictate that an investigation of the South African educational context be undertaken.

1.4.1 An overview of the South African educational situation

The view of COSAS (1984, quoted in Christie, 1991:14) that

> [T]he education we receive is meant to keep the South African people apart from one another, to breed suspicion, hatred and violence, and to keep us backward. Education is formulated so as to reproduce this society of racism and exploitation

serves as a succinct synopsis of the underlying educational thrust of the previous government. The coming to power of the National Party in South Africa in 1948 realized an explicit educational policy which resulted in segregated education for the different races and inferior education for 'Blacks' (Samuel and Naidoo 1992). These are embodied in the reports of the Eiselen Commission and the passing of the various Apartheid Education Acts during the 1950s and 1960s (Tikly 1993). The *Eiselen Report* and the Bantu Education Act of 1953 constitutionally entrenched separate education, while the Acts of 1963 and 1965 ensured that 'Black', 'Coloured' and 'Indian' education became governed by separate education bodies which, though separately funded, were subject to central control by the government (Christie 1991). Between 1983 and 1995, 'Black' education was under the control of the Department of Education and Training and the various education departments in the different Homelands (Carpenter 1987). 'Coloured' and 'Indian' education fell under the jurisdiction of the House of Representatives and the House of Delegates respectively, while 'White' education was governed by the four provincial education departments. This fragmented situation underlies Reagan's (1990:61) observation that

> ...there is not an educational system in South Africa; rather, there are four distinct and independent educational systems, one serving each of the racial groups established by law in South Africa.

In addition, with the implementation of the findings of the *Eiselen Report* and the passing of the Separate Education Acts, Christian National Education (CNE) became the underpinning

ideology of education in South Africa, with Fundamental Pedagogics becoming its central educational expression (Ashley, 1989).

According to Hofmeyr (1982), the ideology of CNE is based on the dual principles of Calvinism and Afrikaner Nationalism, summarised by Meerkotter and Van den Berg (1994b: 299) as follows:

> CNE reflected the belief that the Afrikaners were the chosen people of God placed in South Africa to civilize and to Christianize the indigenous inhabitants; that this God-bestowed right and responsibility of trusteeship required of the trustees that they educate the indigenous peoples in the life and world view of the Afrikaners; and the outworking of this trusteeship would be the recognition by the various groups within the country of their own separate nationhood, resulting in the transformation of the land area into a variety of separate states, one for each nation.

Concomitantly, according to Reagan (1990:65), the central tenet of Fundamental Pedagogics is:

> ...that different cultural groups have different 'philosophies of life', and that, in turn, appropriate educations for different cultural groups must therefore be grounded in significantly different philosophies of education.

This separatist formulation of apartheid education is further reinforced by Hartshorne's (cited in Hofmeyr and Buckland 1992) assertion that education for the last forty years has been used to divide and control, and to protect white privilege and power, socially, economically and politically. Meerkotter and Van den Berg (1994a:3) concur in their argument that schooling in this country

> has played a well-nigh demonic role in the perpetuation and consolidation of the political exclusion and economic exploitation of the great mass of people.

This exclusion and exploitation was ensured through apartheid education policy, which deliberately created gross inequalities across the various racially segregated education departments in terms of pupil-teacher ratios, the levels of teacher training and the per capita expenditure per pupil[1].

The NEPI Report (1992: 17) provides a further dimension to the damage wrought by apartheid education through the mechanisms of CNE and Fundamental Pedagogics in contending that these were

> intellectually harmful in that [they] neutralize[d] and depoliticize[d] educational discourse, and [did] not provide students and teachers with the concepts necessary to assess critically [their] claims about education.

Taylor's assertion (1993) that apartheid education, at bottom, was engineered to instill a passive acceptance of authority rather than to provide students with the conceptual tools necessary for creative, critical and independent thought, further reinforces this political dimension of apartheid education.

The elements of both the quantitative and the qualitative[2] dimensions of apartheid educational policies became apparent in an overtly sustained form for the first time in the Soweto Uprisings of 1976. The subsequent educational crisis continued through the eighties and into the nineties. In 1993, when this study took place, little had changed: teachers were still involved in chalk-downs, planned or unplanned, and abandoning of classes to attend teacher rallies and teacher strikes was still rampant (The Teachers' League of South Africa, 1994). This state of affairs reflected the insidious influence which CNE and Fundamental Pedagogics had had on educational practice, an influence which will linger for some time to come, unless some

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[1] See the table in Hofmeyr and Buckland (1992: 22) in Appendix 1.

[2] Factors like pupil-teacher ratio and the political emasculation respectively.

form of radical intervention in teacher education occurs (NEPI, 1992).

1.4.2 Continuous Teacher Education

A nationally co-ordinated Continuous Teacher Education (CTE) programme in South Africa, at the time of this study, only exists in potential. The current reality regarding CTE can best be characterised as fragmented amongst numerous stakeholders, ranging from those in officialdom to the most peripheral NGOs (Meerkotter and Van den Berg 1994b)[3].

Formal CTE is offered by all the different educational departments through various colleges, universities and the subject advisory services (NEPI 1992). Those run by the various educational departments themselves are often short and carry neither any credit nor any salary benefits. Furthermore, the programmes run by the educational departments are often characterised by a top-down management style and have agendas determined by the educational departments. My experience, when such programmes actually took place, was that they were an afternoon activity, run by the subject advisory services, to remedy a problem which they perceived teachers to have. Most of these programmes, which were very few in my seventeen years of teaching experience, I call 'examination recipe sessions'. They often came about due to the pupils not performing well in the previous year's standard ten external examination. The consequent agenda of these programmes was, therefore, to improve the examination results of students, an exercise often executed by highlighting the wrong answers given by the pupils and giving the

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[3] The fragmented nature of current Continuous Teacher Education is further evidenced in the fact that, in addition to official provision, independent agencies also provide this facility (Hofmeyr and Jaff 1992). These agencies consist predominantly of independent Non-Governmental Organisations (NGOs), funded by either the local business sector, foreign donors or the various teacher organisations which have their own CTE projects.

correct answers. Never in my career, in these officially-sanctioned CTEs, did we engage in looking at how, as teachers, our ways of thinking and doing could be a possible reason for the poor results of the students.

On the other hand, the programmes run for further qualifications by colleges of education and universities are not only accredited but can also lead to salary increases. In addition, somewhat ironically, the CTE projects provided by the NGOs and certain teacher organisations are generally more innovative, school-focused, curriculum-based, democratic, supportive and co-operative than those of the educational departments[4] (Hofmeyr and Jaff 1992). For example, within the realms of these unofficial bodies, I attended numerous Science Education Project programmes and was a staff member of the Teacher Opportunity Project in Mitchells Plain for a year. I was also involved in presenting teachers' workshops on various environmental education topics under the auspices of the Naturalist Society (NATSOC).

Consequently, it is my opinion that the goals and focus of the CTE programmes of the educational departments and those of the NGOs are world's apart. For example, while some of the NGOs were involved in trying to improve the practice and understanding of teaching, educational departments were narrowly focused on improving examination results.

An additional factor which impacts on CTE is the question of evaluation. Due to the political climate prior to 1995, subject advisors were not allowed on numerous school grounds, which were under the control of the House of Representatives. This was because they were often seen as 'glorified inspectors' trying to maintain the authority of the illegitimate education department. As a result, they were often physically removed and in certain instances their cars were burned. This resulted in the

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[4] The Science Education Project and Teacher Opportunity Programmes, both of which have a developmental orientation, are but two examples.

educational department officially stopping school visits by the subject advisors. They would only visit schools at the request of the schools, something which happened rarely since, in the political climate, it was not the done thing.

Framed by the context outlined above, it can be no surprise that this study took place in an atmosphere which lacked an ethos of Continuous Teacher Education. This factual absence of co-ordinated CTE, nonetheless, for me as a Biology teacher seeking the means to transform both the content and practice of my subject area, did not preclude my personal need to consider more closely how the promise on the horizon of environmental education's possible introduction into South African schools could be drawn into my practice as a means to fostering an ecologically sustained and democratically emancipated living ethos amongst those I taught.

1.5 **Clarifying the Concept of Environmental Education**

Environmental education can be divided into three broad approaches: education *about* the environment, education *in* the environment and education *for* the environment. The approach to which I subscribe and believe is appropriate for this study is education *for* the environment, underpinned by socially-critical theory in order to promote **socially just** and **ecologically sustainable** lifestyles. My views on socially- critical education *for* the environment were greatly influenced by a lecture given by Razeena Wagiet to the Master of Environmental Education students at the University of Stellenbosch. Many of the views in this section emanated from this lecture. This approach to environmental education can best be understood when compared to those of education *about* and *in* the environment.

1.5.1 **Education *about* the environment**

Education *about* the environment is in the view of Huckle (1983;1991), Robottom (1987) and Greenall-Gough (1991)

the most common form of environmental education currently practised. Fien (1990) asserts that knowledge about the environment is essential for informed debate to take place which is directed at solving environmental problems. Education *about* the environment is concerned with the provision of information on the environment and the understanding thereof (Lucas 1979), with the aim of creating both a concern for and an awareness of the environment. Robottom (1987) concurs with Lucas in arguing that the emphasis of education *about* the environment is the provision of facts, concepts and theories about the environment. Frequently, the information about the environment is ecological in nature (Huckle 1985), often forming part of biology and geography curricula.

However, active participation of communities in environmental problem-solving and management (Robottom 1983) not only needs information about the natural environment; it also demands an understanding of the interaction between natural and social systems. Huckle (1983) and Fien (1990) contend that the integration of natural and social systems is more often than not neglected in education programmes *about* the environment. In agreement with Huckle and Fien, Robottom (1987) argues that education *about* the environment ignores the important social aspects of the majority of environmental issues, such as quality of life and human attributes, like beliefs, aspirations, aesthetics and perhaps most fundamentally of all, vested interest, which impact on environmental issues. Huckle (1985) offers a succinct critique of the way education *about* the environment is taught as part of the geography curriculum:

> it acts as an agency for social reproduction due to the nature of teaching being memory based and the content being dealt with as a body of unproblematical facts...social, political and economic processes are often neglected, and so is critical problem solving and interpretation activities.

He concludes that students are exposed to a depoliticised and dehumanised view of the world as a result of this uncritical form of pedagogy.

1.5.2 **Education *in* the environment**

Education *in* the environment is also sometimes referred to as education *from* (Huckle 1983) and *through* (Fien 1992) the environment. Education *in* the environment involves using the environment as a medium for teaching. The environment, be it a beach, a squatter camp, a forest, a river or a school ground gives reality, relevance and practical experience to learning (Queensland Board of Teacher Registration 1993). Teaching *in* the environment has the potential to develop important skills for data gathering and field investigation, such as observation, sketching, photography, interviewing and using scientific instruments. Experiences in the environment can also develop aesthetic appreciation and social skills through groupwork and co-operation (Fien 1988). Greenall (1980:5) describes the opportunities that such direct contact with the environment provides:

> ...the environment can be the place where knowledge about and skills to investigate the environment can be acquired, feelings of concern for the environment can be developed, and active participation in the environmental improvement and protection can take place.

Huckle (1983), however, points out that education *in* the environment may either disregard the social and political factors, or deal with these in a specific way which may highlight social consensus, rather than conflict. In tending to overlook politics, conflict and power issues, Huckle (1986) asserts that education *in* the environment fails to consider the material base of society.

1.5.3 **Education *for* the environment**

Education *for* the environment, on the other hand, aims to promote a willingness and ability to adopt lifestyles that are compatible with the wise use of environmental resources (Huckle 1991). It pursues the formation of appropriate environmental attitudes, ethics and behaviours, as well as the skills needed to generate

a quality environment (Fien 1990). Education *for* the environment is about encouraging active involvement and participation in real and relevant environmental problems and issues.

A core feature of education *for* the environment is the reconception of environmental problems as social and political problems (Robertson 1991). However, there has generally been a reluctance to recognise that environments are indeed socially constructed and that environmental problems facing the majority of the world's people are problems of hunger, clean water, safe and satisfying work, housing and alienation (Huckle 1986). This misconception of what constitutes the environment is seemingly rife in South Africa, as is made clear by Orr (1991: 10):

> Properly speaking, there is no crisis of biological diversity...there is a large and growing political crisis, with ecological and other consequences. We have defined the problem wrongly as one of science, not one of politics. Accordingly, we have focused on the symptoms and not the causes of biotic impoverishment.

Socially-critical education for the environment, on the other hand, places the socially constructed nature of the environment firmly at the centre of the current environmental crisis in linking of education *for* the environment to the socially-critical orientation in education (Stevenson 1993; Greenall-Gough and Robottom 1993). According to Fien (1992: 23), the socially-critical orientation in education is based upon:

> a belief for education to strive for the establishment of just and democratic societies...[which] perceives schools, students and teachers as active members of society who through critical reflection and action, may liberate themselves from the vested interests in society, i.e. the influences of consumerism, the media and other interests.

Huckle (1991) asserts that socially-critical education for the environment is concerned with social reconstruction and justice, as well as with ecological and social sustainability. This orientation of environmental education is crucially appropriate to the South African context, where social justice has been and

still is such a contentious issue. Fien (1992) contends that the objectives and principles for socially-critical education for the environment can be identified and analysed in terms of these five defining characteristics (see table in appendix 2):

i. The development of a critical environmental consciousness, based on eco-socialist beliefs.
ii. The development of critical thinking and problem-solving skills, including those necessary for inquiry and ideological critique.
iii. The development of an environmental ethic based upon a sensitivity and concern for environmental quality, based on the core democratic values that underlie people-nature relationship for ecological sustainability and people-people relationships for social justice.
iv. The development of political literacy.
v. Critical praxis, which encompass appropriate and innovative teaching and learning strategies that are consistent with the goals of socially-critical education for the environment.

Socially-critical education **for** the environment represents a political orientation in environmental education which contrasts with the technical orientation of education **about** and **in** the environment. Certain environmental educators (Huckle 1983; Fien 1990; Greenall-Gough 1991) are of the opinion that education *in* and *about* the environment are valuable only if used to provide the necessary knowledge and skills to support socially-critical education *for* the environment. Implicit in this assertion is the contention that true and effective environmental education only takes place when it is underpinned by socially-critical education for the environment (Huckle 1983; Fien 1990).

1.6 **The Research Participants**

The twenty two research participants in the study, all of whom were approached to take part in the study, were teachers teaching

ecology, either as part of the biology curriculum or as part of the geography curriculum, at ex-House of Representative's high schools on the Cape Flats in Cape Town. They were drawn from the biology and geography departments of Belgravia High School, where I teach, from the biology and geography departments of the five high schools in the immediate neighbourhood and from amongst my personal and professional acquaintances[5].

The research participants comprised a well-qualified group of teachers, of whom eight had post-graduate qualifications, thirteen were university graduates and eight were fourth year diplomats of colleges of education. As a group, they had also had considerable teaching experience with 16 having had four years or longer in the field (see the Table below).

YEARS OF TEACHING EXPERIENCE

Number of Years	Number of Teachers
1	3
2	1
3	2
4	5
5	2
6	2
7	3
9	1
12	1
14	1
25	1

These participants also had a wide range of years of experience

[5] Many of the participants had attended workshops on ecology on previous occasions where I was involved, or we had worked on common projects such as Winter Schools for matriculants, or I had taught them biology at Belgravia High School, or they had been part of the Method of Biology class I lectured to at the University of the Western Cape, or we had studied together in the Zoology Department at the University of the Western Cape.

in teaching ecology, indicated in this Table:

YEARS OF TEACHING ECOLOGY

Number of years	Number of Teachers
1	3
2	3
3	5
4	3
5	3
7	2
8	3

Of these participants, eighteen used fieldtrips as an integral part of teaching ecology. Only the three teachers who had begun teaching that year and one other did not employ fieldtrips in the teaching of ecology. This, to me, was a manifestation of the quality of the teachers with whom I was working. As the study progressed I realised more and more how privileged I was to be working with a group of teachers of such a high calibre.

1.7 An outline of the Chapters of the Thesis

The rest of the thesis consists of four chapters. Chapter 2, '**In Search of a Method**', sketches the theoretical journey followed in deciding on the method used in this study. The issue of validity in participatory research is also discussed in this chapter.

Chapter three, '**Exploring the Problem**', reviews the literature that is central to this study. A narration of the stages of the study is given in chapter four, '**Working with the Method**'. These include the interviews, the workshops, the 'sensing the urban environment' fieldtrip and the evaluation sessions. '**Reflecting**

on the Process' (chapter five) analyses the research 'story' in relation to the goals of this study, and discusses the implications of the knowledge that emerged from this study for future action.

CHAPTER TWO

IN SEARCH OF A METHOD

2.1 Introduction

This chapter describes the journey undertaken *in search of a method* for this study, and consists of three main sections. The first (section 2.2) explores and clarifies the theoretical knowledge which guided me to the method adopted in this study. This section consists of two subsections: the first looks at three research paradigms (Robottom 1988) with the aim of identifying the paradigm most appropriate for this research project, while the second examines why I consider emancipatory action research the most appropriate method for this research project. The second section (2.3) extrapolates on the process involved in the study by placing under scrutiny the five stages of the research: exploring the problem; the interviews; the workshops; the 'sensing of the urban environment' excursion; and the evaluation sessions. The last section of this chapter (2.4) discusses validity.

2.2 Theoretical Background

In this section I explore and attempt to clarify the theory of knowledge that guided me in my search for a method. I first examine three research paradigms, and then discuss why action research is the method most appropriate to this research project.

2.2.1 The Relevance of Research Paradigm Considerations

Fien (1992) provides a useful overview of what constitutes a research paradigm in contending that research paradigms provide the philosophical framework that guides research activity. Both

the elements of a research paradigm as well as some of the tensions and contradictions which have to be contained by it are expounded on by Patton:

> A paradigm is a worldview, a general perspective, a way of breaking down the complexity of the real world. As such, paradigms are deeply embedded in the socialization of adherents and practitioners. Paradigms tell them what is important, legitimate and reasonable. Paradigms are also normative, telling the practitioner what to do without the necessity of long existential or epistemological considerations. But it is this aspect of paradigms that constitutes both its strength and their weakness - their strength in that it makes action possible, and their weakness in that the very reason for action is hidden in the unquestioned assumption of the paradigm (1990:37).

Husen (1988) argues that a paradigm determines the criteria a researcher uses to select and define problems for research. Kemmis (1982) believes that there is a need for a research method to match the ideological orientation of the type of educational process being studied because different orientations to research construe the objects of research differently. Guba and Lincoln (1982) agree with Kemmis but take the argument further when they contend that, for a study to create meaningful findings, there must be a relationship of congruence not only between paradigm and method but between problem, method and paradigm. Popkewitz (1978:29) takes the argument even further by stating that research techniques e.g. interviews, surveys, workshops need to be congruent with the research paradigm and method in a research project. He argues that research techniques "emerge from a theoretical position and therefore reflect values, beliefs and dispositions towards the social world."

In the light of these views, it became important for me to consider which research paradigm, method and techniques would allow the emancipatory stance of this research project (See section 1.2) to be realized. These considerations were also important for me, especially in the light of having done scientific research prior to this study in which I

unquestioningly assumed that the scientific way was the only way to do research.

For the purpose of this study, Robottom's (1988) terminology for research paradigms will be used: viz. Positivist research paradigm, Interpretive research paradigm and Critical research paradigm. Notwithstanding the broader contributions to the paradigm debate (Postmodernist, Poststructuralist, etc.), I selected these three paradigms as I feel they are the three basic paradigms for me as a novice in social science to develop an understanding of this debate.

2.2.1.1 **The Positivist Research Paradigm**

The positivist research paradigm views reality as existing 'out there', outside of people (Robottom and Hart 1993), while research, in this paradigm, is seen as the process of gathering information that is independent of the researcher (Hillcoat 1993). In addition, in the positivist research paradigm, knowledge is regarded as given and as value-free (Schubert 1986), which is only valid if experientially (Codd 1982) derived by experts (Carr and Kemmis 1986). Consequently, there is no place for knowledge as a social construct in this paradigm. Furthermore, this type of research is underpinned by a definite division of labour between the teacher and the outside 'expert':

> The teacher is relegated to the position of technician in carrying out the 'treatment' as requested by the 'outside expert' researcher. (Robottom 1988:16)

Positivist research approaches seek to apply the methods of natural science to the problems of education. Research is conducted mainly by using quantitative methods based on statistical techniques. Travers (1969:16) summarises the aim of research in the positivistic research paradigm as:

> an activity directed towards the development of an organised body of scientific knowledge...which reveals laws of behaviour that can be used to make predictions and control events within educational situations.

There are two major reasons why this research paradigm is inappropriate for the current research project. In the first instance, the positivistic notion that knowledge is a given and therefore value-free is problematic, since these assumptions run counter to the search in this project for what constitutes reality for ourselves as teachers in our educational situations[1] (see section 1.4). Rather, in this study, we, the teachers, engaged in making meaning of our reality and the knowledge that emerged was therefore a social construct. In this process we offered our interpretations, used our gut feelings and applied our values (Carew and Lightfoot 1979). Therefore, in this project, knowledge cannot be considered value-free.

In the second instance, the view that knowledge is derived by 'outside' experts is in conflict with the participatory nature of this project, as is the aloofness of the researcher from the researched in positivistic research, isolating the researcher from the 'real' world (Malone 1993). We, the teachers (research participants) and not outside experts, are the researchers in this project. In addition, often the only contact between the researcher and the researched is a questionnaire, with most researchers not even visiting the 'place' of the researched which, in this project, is the school. Such an approach, as pointed out by Kincheloe (1991:134), is unacceptable:

> The 'place' in which social activity, consciousness construction, and schooling occurs cannot be dismissed by the inquirer.

If the 'place' of the researched is dismissed, the knowledge claims of this type of research will tell us little about how consciousness is constructed by the teachers or about how schools function (Kincheloe 1991). I believe that this knowledge is essential for this project with its emancipatory stance (See section 1.2).

2.2.1.2 **The Interpretive Research Paradigm**

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[1] i.e. the 22 research participants in this study.

Instead of focusing on the observable and seeking causal explanations and universal laws of social life, as is the case for the positivist research paradigm, the interpretive research paradigm attempts to uncover the meaning participants give to their actions, especially their social interactions (Robottom 1988). The emphasis is on the interpretation of the actions of the researched in a specific social context, rather than on prediction and control (Carr and Kemmis 1986). In this paradigm, in addition, knowledge is socially constructed (Fien 1992) and can have multiple meanings (Codd 1983). Consequently, due to its everchanging nature (Lather 1988), knowledge can never be considered as the ultimate truth. In this paradigm, reality exists 'with-in' and not 'out-there', outside of people, and therefore knowledge is not considered to be value-free.

The interpretive research paradigm, with its central acknowledgement of the socially constructed and everchanging nature of both meaning and reality, therefore goes some way in meeting the requirements of the research method required to frame this study. Its essential drawback as a framework for the current research is pinpointed by Robottom (1988: 20) who argues that "interpretive approaches are only 'a step to action'; they do not necessarily take anyone into action."

The lack of an inherent action component in the interpretive research paradigm, through which participants can discuss ways in which they could change their practice, effectively renders this approach untenable to drive this study, with its emancipatory orientation (see section 1.2).

A further fundamental limitation of the interpretive research paradigm is that it does research **for** and not **with** people. The researcher stands 'outside' of the research process, a position which is incongruent with the participatory nature of this research project, in which, as a community of teachers, alternative ways of thinking, doing and being in this research process have to be engaged (see section 1.1).

A final flaw in this paradigm which renders it inappropriate for this research project is that it does not allow for an analysis of the origins of the forces which have constructed the participant's consciousness (Kemmis 1988). And, as Kincheloe (1991:35) contends, "[w]ithout such information...emancipatory action is impossible."

2.2.1.3 **The Critical Research Paradigm**

Research in the critical research paradigm, with its focus on attempting to

> ...uncover social relationships and interests they serve, to improve actors' understanding of the way their social lives are determined by conflicts and contradictions in their social order, and importantly, of the ways in which they can act to alleviate imposed constraints by changing that social order (Robottom 1988:23),

seems ideally situated to accommodate the emancipatory concerns of this study. This suitability is further reinforced by the fact that educational research in the critical paradigm has the aim of

> ...involving teachers, students, parents and school administrators in the task of critical analysis of their own situations with a view to transforming them in ways which will improve these situations as educational situations for students, teachers and society (Carr and Kemmis 1986: 157).

This thrust is in line with Green's (1990) assertion that research must not only interpret reality, it must attempt to transform it.

Guba (1990) sees research in the critical paradigm as ideological inquiry. Researchers in this paradigm are openly ideological in their approach as they use critical reflection to critique their ideological assumptions. Thus, the critical research paradigm, with its openly ideological stance and emancipatory objectives, is best suited to frame this study with its *socially critical*

education for the environment approach to environmental education (see section 1.5.3) and my assumption that education should have a counter-hegemonic goal if it is to play a role in transforming society in a post-apartheid era in South Africa (see section 1.2).

A research method that is congruent with the assumptions of the critical research paradigm is emancipatory action research (Carr and Kemmis 1986, McTaggert 1991, Robottom and Hart 1993). Consequently, this is the research method adopted for this study.

2.2.2 **Action Research**

The following discussion of action research is divided into three areas: viz. the nature of action research, the three modes of action research and the action research spiral.

2.2.2.1 **The Nature of Action Research**

Kemmis and McTaggert (1990:5) define action research as:

> ...a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations that these practices are carried out.

Huizer (1984) describes action research as research into practice, by practitioners, for practitioners, while Grundy (1987) suggests that the process of action research is grounded in the two essential principles of improvement and involvement. Grundy and Kemmis (1981) contend that action research aims at improvement in three areas, viz.:

- the improvement of the practice;
- the improvement of the understanding of the practice by the practitioners; and,
- the improvement of the situation in which the practice takes place.

The principle of involvement in action research underscores the collaborative participation of the research participants in playing a role in all aspects of the research process. This process of research avoids the traditional top-down power relationship of researcher and researched. Kemmis and McTaggert (1988:5) emphasise the collaborative nature of action research in their definition of action research as a form of collective self-inquiry.

Action research could thus lead to empowering the people who normally are just the objects of research, to develop their capacity to research their own situation and evolve their own solutions. This emancipatory goal of action research through enlightenment is clearly outlined by Carr and Kemmis (1986:180):

> ...action research provides a means by which distorted self-understandings may be overcome by (participants) analysing the way their own practices and understandings are shaped by broader ideological conditions.

Action research, in this sense, creates the opportunity for practitioners to understand how their practices are socially constructed in a specific historical context. Action research therefore has the potential of developing 'organic intellectuals' (Gramsci 1971), a situation in which expertise could be available to all, rather than as a form of power for a few (Connell et al 1982).

2.2.2.2 **Three Modes of Action Research**

Grundy (1987), applying Habermas's (1972) three knowledge constitutive interests, describes three modes of action research: viz. the technical, the practical and the emancipatory.

Tripp (1984:12) summarises **technical action research** as:

> Other directed, individual or group generally aimed at improving existing practices, but occasionally at

> developing new ones, within existing consciousness and values with an unproblematised view of constraints.

He regards technical action research as similar to 'workmanship' in that it promotes the improvement of the technique of teaching. Carr and Kemmis (1986), however, take a negative view of technical action research as they fear that it might involve the co-option of teachers to work on external agendas which are not part of their lived experiences. Walker (1993:104-105) criticises the notion of technical action research in stating that:

> This form promotes efficient and effective practice in the interest of prediction and control rather than the development of teacher understanding of practice.

Regarding **practical action research**, Walker (1993:105) asserts that it involves

> ...the self-understanding of practitioners, fostering teacher judgement and understanding in making decisions about classroom change in the interests of pupils...Nonetheless, the practical form lacks a critical focus on the structural context which shapes institutional practices.

Thus, although practical action research is directed by the practitioners and is reflective and interpretive with the aim of taking strategic action (Kemmis and McTaggert 1988), it does not allow practitioners to question how wider social relations might enable or constrain their practice (Walker 1990).

For Grundy (1987:154), **emancipatory action research** attempts to:

> ...promote[s] a critical consciousness which exhibits itself in political as well as practical action to promote change.

Consequently, the ethic underpinning emancipatory action research revolves around the pivotal social and political ideals of freedom, equality and justice (Walker 1990). It is further argued (Kemmis 1988) that teachers need to acknowledge the political context of their practice and must teach with democratic political intent. Emancipatory action research thus has an

overtly political stance in its goal to arm the marginalised classes ideologically and intellectually to take their place as conscious actors in history (Borda 1979). In the South African context, Robinson (1993) therefore believes that this type of research cannot separate classroom practice from the struggle to build a just society in South Africa.

In conclusion, McTaggert and Singh (1986) argue that the only form of action research is emancipatory action research. They do not regard the technical and practical forms as action research. They believe that to be called action research, it must be emancipatory.

I adopted the emancipatory action research as the method for this study for two reasons. The first lies in its emancipatory goal, while the second stems from my believe that education needs to change ideologically and structurally if it is to play a role in transforming South African society in a post-apartheid era.

2.2.2.3 **The Action Research Spiral**

Grundy (1987) states that the process of action research consists of four phases which form the action research cycle: the planning phase, the action phase, the observation phase and the reflecting phase. Davidoff (1994:267) reinforces Grundy's point of view in asserting that

> action research provides a systematic way of planning an action, doing the action, observing the action, reflecting on the action, and then planning a revised action.

The planning phase involves the development of a plan of critically informed action, which addresses the problem the participants have set out to solve. Kemmis and McTaggert (1990) regard this plan as constructed action.

During the action phase, the participants put their plan into action. Practice is perceived as ideas in action to be used as a platform for the further development of later action.

The observation phase examines the participants action in the light of their plan. Kemmis and McTaggert (1988) elaborate on the observation phase in contending that the participants must observe the following:

- the action process;
- the effects of action;
- the circumstances of and constraints on action; and,
- other issues which arise.

The aim of observation is to lay the basis for critical self-reflection (Kemmis and McTaggert 1988).

The reflective phase involves looking backwards critically at what has happened with the aim of informing future action. These reflections thus inform the basis of the plan of the next action research cycle. The action research process consequently consists of recurring action research cycles which coincide to form the action research spiral.

2.3 **The Conduct of the Study**

The study consisted of five stages:

- exploring the problem;
- the interviews;
- the workshops;
- the 'sensing the urban environment' fieldtrip; and,
- the evaluation sessions.

2.3.1 **Exploring the problem**

This stage involved reviewing the literature on the research problem. Reviewing the literature not only increased my theoretical understanding of the research problem; it also served

to guide me in making a decision regarding the research method to be adopted in this study (see section 2.2). This stage is the focus of chapter three where it is discussed in detail.

2.3.2 The interviews

The interviews had three primary functions:

- to initiate initial contact with prospective participants for the study;
- to discover whether the prospective participants I had approached were in a position to take part in the study; and,
- to negotiate an agenda for the study with those who agreed to participate in the study.

In order to accommodate these requirements, a semi-structured interview (Burroughs 1975) was used in this study. This type of interview consists of pre-set questions but allows interviewees freedom to digress and raise their own topics as the interview progresses (Elliot 1981). This approach also allows the interviewer greater flexibility and freedom to ask questions, in addition to those in the schedule (Borg and Gall 1979).

Each participant was interviewed individually at the start of the study. These interviews were recorded and transcribed. The schedule and outcome of the semi-structured interviews are discussed in section 4.2. In addition to the interview, the interviewees were asked to complete a personal data sheet (see appendix 3).

2.3.3 The workshops

Workshops can be used in research to allow a group to engage in collective meaning-making on a specific topic. The importance of

workshops in participatory research is succinctly expressed by Hope and Timmel (1986:3):

> Participation means dialogue. Dialogue is based on people sharing their own perceptions of a problem, offering their opinions and ideas, and having the opportunity to make decisions or recommendations.

Participation by all the individuals in the group is an essential feature of workshops. This feature of workshops makes it an appropriate research technique to collect data in emancipatory action research. Another strength of workshops is that all the participants and not only the researcher have the potential to grow intellectually.

Five workshops were held after school-hours at different venues during this study (see chapter 4). The participants each received hand-delivered notices (see appendices 4.1-4.8) of each workshop. Various pieces of literature I had selected accompanied the notice. These included articles, summaries of previous workshops, copies of lectures given at previous workshops and information relevant to the topics to be discussed. A complete list of the literature received by the participants is found in Appendix 5.

The first part of each workshop consisted of a lecture or lectures on the topics which had been collectively determined. This was important to ensure that the knowledge constructed during the workshops was not only the product of popular wisdom (Janse van Rensberg 1994). After the lectures the participants divided themselves into groups consisting of not more than five persons, since they felt more relaxed working in small groups. These small-group discussions were the most important part of the workshops, since it was here that the participants most readily shared their perceptions and offered their opinions and ideas.

A major shortcoming of the data collection in the workshops, however, was my failure to directly record the actual dialogues generated in the various small groups discussions. In retrospect, I believe that mere report backs of information can never do

justice to the discourse which took place in these small group discussions. This perception is reinforced by Reddy (1994) who, in recording both the report backs and the small group discussions, found that these provided greater insight into the data collected.

At the end of the small group discussions, each group reported back to a plenary session, which allowed the participants to interact further with the various views expressed by the groups. The groups used overhead transparencies for their report-backs, which were kept as a source of data. In addition, these report-backs were also recorded.

Each workshop was meant to conclude with an evaluation; however, due to time constraints, the reality was somewhat different, as detailed in chapter 4.

2.3.4 The 'sensing of the urban environment' fieldtrip

During the fieldtrip we explored the potential of various sites (see subsection of section 4.10) in the urban environment for the teaching of ecology. Copies of worksheets (see appendix 6.1-6.8) which had been developed by the participants for the various sites in the urban area we had identified for the teaching of ecology were filled in by recording the presentations given by the participants at the various sites, thereby generating data. I also recorded four evaluation sessions during the fieldtrip with some of the participants. A detailed depiction of the fieldtrip is given in subsections of section 4.10.

2.3.5 The evaluation sessions

The description of the evaluation sessions is divided into two subsections: viz. the sessions during the study and the focus group evaluation session at the end of the study.

2.3.5.1 **The evaluation sessions during the study**

The evaluation sessions during the study were all examples of formative evaluation (Patton 1990). These sessions informed and directed the research process with the purpose of improving it, despite the fact that they did not follow a prescribed schedule but developed organically out of the concerns of the participants to improve and inform the next workshop.

From the outset of this study, two 'critical friends' (UNESCO 1994), both of whom were participants in the study, played a central role in the ongoing evaluation and development of the study. They formed part of the initial pilot interview, where I interviewed the one 'critical friend' while the other sat in and listened. After the pilot interview, they constructively critiqued the interview schedule and the process of the interview. Their views were incorporated into the revised interview schedule, which was subsequently employed to negotiate the involvement of the other participants as well as the agenda of the study (see sections 2.3.2 and 4.2). Furthermore, immediately, after each workshop, I discussed the pros and cons of the workshops with them. Their input filled the void created by not being able to end the workshops with an in depth evaluation session (see section 2.3.3). My 'critical friends' also read draft copies of the chapters of the thesis as part of ensuring the face validity (see section 2.5.2) of this study.

However, due to various constraints, time being the most pressing, these evaluation sessions were inevitably flawed. Not only had the first two workshops ended without any evaluation but most of the others culminated in unsatisfactory feedback (except the one held at Westridge High School). Therefore, in order to counteract this deficiency, I held, what amounted to an ad hoc emergency evaluation session with the three participants at Ned Doman High School. This took place after the first two workshops, during school time when I had two free periods (see section 4.5).

2.3.5.2 **Focus group evaluation**

The focus group interview in this study was guided by a semi-structured interview schedule (see appendix 7). Patton (1990:335) describes the aim of the focus group interview, which he considers a summative evaluation of a study as a whole, as being

> to get high-quality data in a social context where people can consider their own views in the context of the views of others.

A focus group interview thus involves a small group of people, usually numbering less than eight, who focus on a specific topic. The participants are asked to reflect on the questions asked by the interviewer. They hear each others responses and can make additional comments beyond their own original responses.

A possible weakness of the focus group interview is that it holds the potential to suppress individual opinion if it is allowed to be dominated by one or two persons. However, this possibility was preempted in the current study as I was aware of this potential drawback and consequently facilitated the process in such a manner to ensure active involvement by all the participants. A further factor which prevented the domination of the focus group evaluation session by one or two participants was the fact that all the participants had had extensive interaction with one another prior to the focus group interview[2]. As a result, they were very relaxed with each other, and the group dynamics at this stage of the study was of such a nature that no participant felt threatened or intimidated.

All the evaluation sessions were recorded and a detailed description of them is presented in chapter four.

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[2] i.e. in five workshops and an excursion.

2.3.6 The five stages of the study and the action research cycle

The five stages of the study (see section 2.3) comprised the four phases of the action research cycle (see section 2.2.2.3) in the following way:

- exploring the problem, the interviews and the first workshop made up the planning phase of the action research cycle;
- the action phase consisted of the workshops and the 'sensing of the urban environment' excursion;
- the observation phase of the action research cycle included the evaluation sessions during the study;
- the focus group evaluation session formed the reflection phase of the action research cycle.

The study thus comprised a complete action research cycle in an action research spiral. The second action research cycle in this action research spiral is the formation and functioning of the Biology and General Science Teachers' Forum (see section 2.4.2).

2.4 Validity

Validity has long been a key issue in debates regarding the legitimacy of qualitative research (Maxwell 1992). Kincheloe (1991:135) articulates some of the problems of validity (in the traditional sense) in relation to qualitative research as follows:

> ...validity is probably an inappropriate word in the non-positivistic context. We need to move beyond the attempt to develop critical qualitative research criteria that parallel those of the positivist paradigm.....validity means much more than the traditional definitions of internal and external validity.....Is trustworthiness a more appropriate word to use in a critical constructivist research lexicon? Maybe such a word is helpful because it connotes and signifies a different set of assumptions about research purposes than does the term 'validity'.

It is apparent, therefore, that qualitative research requires techniques and concepts to obtain data and define it as trustworthy which are radically different from those employed in quantitative research (Kirk and Miller 1986; Guba and Lincoln 1989). In this respect, I am in agreement with the argument that the word 'trustworthiness' is more appropriate than validity; however, for this study I will be using the topology of Lather (1986) which employs the term 'validity' albeit not in the positivistic sense. She describes four ways of validation which have been elaborated on by later writers: viz. triangulation, face validity, catalytic validity and construct validity.

2.4.1 Triangulation

Triangulation is the use of two or more techniques of data collection to establish the trustworthiness of the researchers' observations and findings (Hillcoat 1992). The factual accuracy of their account is of concern for qualitative researchers to ensure that they are not making up or distorting the things they saw and heard (Walcott 1990; Maxwell 1992). Triangulation was employed in this study by using various techniques of data collection. These include the recordings of the interviews, the report-backs of the workshops and documents produced during the study. The documents include the transparencies used by the participants in their report-back in the workshops, the worksheets the participants created for the 'sensing of the urban environment excursion' (see appendices 6.1-6.8) and the outline of a resource that the participants created for various sites in the urban environment (see section 4.12).

2.4.2 Catalytic validity

Fien (1992) suggests that catalytic validity pertains to the extent to which the research process enables participants to construct their own reality in order to change it in ways of their own choosing. Freire (1973) calls this process

conscientization. Lather's (1986:272) views are similar to Fien's (1992) when she argues that:

> ...catalytic validity is premised not only within a recognition of the reality-altering impact of the research process, but also in the desire to consciously channel this impact so that respondents gain self-understanding and ultimately, self-determination through research participation.

I observed catalytic validity as an outflow of this study in various ways:

- One of the participants in the project, who was involved in his own research, included workshops as one of his research techniques to obtain a greater participant involvement in his research. The participant stated that this decision was due to his participation in this study.
- In 1994, I presented a talk on curriculum development at one of the research participant's schools. This was part of a project to develop a new curriculum for standard six general science. This initiative, the participant stated, was a direct outflow of his participation in this study.
- Two of the participants enroled for the B.Ed. course at the University of Cape Town at the beginning of 1994 and included the module of environmental education in their course.
- At the beginning of 1994, I ran workshops with my pupils to ascertain their views on how they want to be taught and what their expectations are of the course for the year. We negotiated this agenda to make myself overtly accountable to the pupils, rather than only them to me. I did this in order to address the top-down power-relationship in my classes.
- At the end of 1994 a number of the participants of the study formed the Biology and General Science Teachers' Forum. We developed, and in 1995 implemented, alternative general science curricula for standards six and seven and biology curricula for standards eight and nine. I see this second action research cycle as an outflow of this study.

I acknowledge that there are no doubt other examples of catalytic validity that I am not aware of.

2.4.3 Face validity

Reason and Rowan (1981) describe face validity as the process of going back to participants with the tentative results of the research and refining them in the light of the feedback that is received. Hillcoat (1992) believes that without face validity, the credibility of the data in qualitative research is suspect. In participatory research, the importance of face validity is summed up by Heron (1986:34):

> ...the moral principle of respect for persons is most fully honoured when power is shared not only in the application ... but also in the generation of knowledge.

Face validity was employed by giving draft forms of the chapters of the research to a few of the participants for their comments.

2.4.4 Construct validity

Fien (1992) believes that construct validity is founded on the dialectical relationship between theory and data. The earlier writings of Lather (1986:271) elaborate on Fien's view by arguing that:

> A systematized reflexivity, which gives some indication of how a priori theory has been changed by the logic of the data, becomes essential in establishing construct validity in ways that will contribute to the growth of illuminating and change-enhancing social theory.

Maxwell (1992) concurs with Lather in contending that construct validity goes beyond descriptions and focuses on the theoretical constructions that the participants bring to, or develop during the study.

Validation is vital in this study for the following reasons:

- Triangulation ensures the trustworthiness of the data which forms the basis for the reflections in chapter five.

- Catalytic validity will give us an idea to what extent, if any, the process of this study influenced/changed the participants' ways of thinking and doing. Furthermore, the research question (see section 1.3), ***'What did we achieve during this process?'***, is addressed, to some extent, by catalytic validity.
- It will be possible to gauge to what extent the theory of face validity is realised, a factor essential to participatory research project. In addition, it will address, to some degree, the rhetoric-reality gap (Fien 1992) in looking at how theory comes 'alive' in practice in a 'real situation'.
- Construct validity will be central to some of the discussions in chapter five to reflect on the theoretical constructions that the participants brought to or developed during the study.

CHAPTER THREE

EXPLORING THE PROBLEM

3.1 Introduction

This chapter is concerned with three interrelated areas. Firstly, it considers issues central to this research, such as teacher education and the notion of teacher empowerment. Secondly, an attempt is made to construct a theoretical base for the concept of teachers as researchers, which forms the focus of this research. And thirdly, this chapter seeks to develop a theory of knowledge which can be used in Chapter Five, *Reflecting on the Process*, to analyse the research process.

3.2 Environmental Education in Teacher Education

Several international conferences and reports have highlighted the importance of teacher education in environmental education. For example, as far back as 1971 at the IUCN conference on environmental education in Switzerland, it was recommended that all prospective teachers should develop the expertise to implement environmental education at their future schools (Williams 1985). In addition, the importance of teacher education in environmental education was also highlighted at the following international conferences: Tbilisi (1977), in Moscow (1987), the Bergen Conference (1990) and the Earth Summit (1992) in Rio (Wagiet 1995).

Several UNESCO reports have also accentuated the need for teacher education in environmental education. Simpson et al. (1988: 18),

for example, note that

> [I]ntensive teacher education, not merely orientation, is essential if the present fragmented approaches of traditional education are to be transcended in favour of a holistic, global approach, and interdisciplinary and multidisciplinary treatment of issues. It would require a thorough change in both the outlook and preparation of teachers and teacher educators ... the task is more complex than putting environmental content into existing curricula .

The UNESCO International Environmental Education Programme of 1991 viewed the development of environmentally educated teachers as the "priority of priorities" (UNESCO-UNEP, 1990: 1) for the successful implementation of environmental education.

In South Africa, there have been numerous calls for the introduction of environmental education in teacher education, with Hurry's (1982) being one of the first. Two years prior to the UNESCO-UNEP report of 1990, in a paper entitled *Priorities for environmental education in Southern Africa*, presented to the National Conference of the Wildlife Society of Southern Africa, Irwin (1988) already argued that the first priority in environmental education ought to be given to teacher education. Others who have voiced similar sentiments in South Africa over the years include Richards (1985), Loubser (1991), Leketi (1992), Shongwe (1992) and Wagiet (1995). The Environmental Education Policy Initiative (1994) recommended that environmental education should be a compulsory component of all initial teacher education in the colleges and universities.

In the domain of officialdom, the *White Paper on Environmental Education* (DEA 1989), produced by the Department of Environmental Affairs, was the first governmental document on environmental education. It proposed that environmental education should be part of both pre- and in-service teacher education. Since then, the *White Paper on Education and Training* (DE 1995) and the COTEP document (1995) have both acknowledged the importance of environmental education in teacher education.

3.2.1 Problems with Environmental Education in Teacher Education

Despite the numerous international statements and recommendations about the importance of environmental education in teacher education, a review undertaken by the International Environmental Education Program revealed important shortcomings in the provision of appropriate teacher education in many parts of the world. Wilke, Peyton and Hungerford (1987: 1) concluded in this report that:

> Few, if any, teacher training programs adequately prepare teachers to effectively achieve the goals of environmental education in their classrooms.

Spork (1992) concurs with Williams (1985) that although there is a growing interest in environmental education at the teacher education level, there is little planning, coordination, professional development or research in this area. Wagiet (1995) found a similar situation in South Africa with regards to environmental education at initial teacher education level.

This lack of environmental education at initial teacher education level is exacerbated by the general scenario of the in-service education of teachers. Fensham (1994) points out that the in-service education of teachers often consists of a number of unconnected topics about content and pedagogy which do not take into reckoning the contexts of the 'lived experiences' of the teacher participants with their contextual constrains. Furthermore, in-service teacher programmes largely lack co-ordination (NEPI 1992).

In the realm of environmental education, it has been my experience that any in-service teacher education in environmental education has taken place under the auspices of NGOs, and has often not been an ongoing, pedagogical process. This has resulted in very little, if any, professional development of the participants in the programme.

3.3 **Professional development of teachers**

Ongoing professional development programmes of teachers are widely acknowledge as important within educational systems (Grundy 1987). Robottom (1987) argues that professional development in environmental education has a duel challenge. The first resides in the counter-hegemonic objectives of environmental education that endeavour to transform the 'business as usual' approaches to development into ecologically sustainable approaches. The second challenge involves the discovery of professional development experiences and processes that can conscientise the teachers to the transformative nature of their field and empower them to be active, critically-reflective teachers in their practice. This research project focuses on especially the second challenge in trying to find professional development experiences which can facilitate the empowerment of the teachers in the domain of environmental education.

Robottom (1987) asserts that professional development of teachers in environmental education must be underpinned by a form of educational inquiry that promotes a critical analysis of theories, practices and settings. Robottom (1987) further contends that professional development must possess at least the following two qualities:

- it must recognise the theoretical constructions of teachers about curriculum and teaching practice;
- it must accept that the educational problem of environmental education does not only consist of the difference between the teachers' theories and practices (false consciousness) but also of the discrepancies between the teachers' theory and practice on the one hand and social structures and relations on the other (oppression or hegemony).

Professional development programmes must therefore address the twin problems of false consciousness and hegemony prevalent in our practice as teachers.

One of the ways of addressing these two aspects of professional development requires a transformation of the consciousness of the teacher. Freire (1972: 128) refers to this process as "conscientization" through which

> ...the necessary means by which men (sic), through true praxis, leave behind the status of historical subjects.

Grundy (1987: 191) sees this process as a:

> ...transformation in which knowledge and action are dialectically related through the mediation of critical reflection. This is a reflexive rather than a linear process, with the transformation displaying itself in increasing moments of emancipatory praxis rather than developmentally improved practice. The process of professionalization is a pedagogical process, not a developmental one.

For this form of professional development to be realized we, as teachers, need to radically change our way of thinking and doing. We will have to take our destinies into our hands and not let our professional development be dictated by central authorities or professional bodies. However, if this is to occur, the following conditions, as identified by Carr and Kemmis (1986: 9) need to be in place:

> First the attitudes and practices of teachers must become more firmly grounded in educational theory and research. Secondly, the professional autonomy of teachers must be extended...Thirdly, the professional responsibilities of the teacher must be extended.

In the *White Paper on Education and Training* (DE 1995), these three conditions have the possibility of being realized. However, this will depend on how the educational authorities are going to implement the ideas espoused in the White Paper on the one hand and how we as teachers are going to play our role in realizing these ideas.

Grundy (1987: 191) argues that action research is an appropriate method for professional development if it is "...engaged in ways that are truly consistent with its epistemological

foundations...[and]...it will become a process of critical pedagogy which will foster the sort of transformation of consciousness which is necessary for a process of professionalization." If professional development in environmental education is to utilise an action research method as a means to teacher empowerment, the feasibility of which forms the focus of this research project, Robottom (1987) contends it should be committed to the following principles:

- It should be inquiry-based in order to encourage teachers to adopt a research stance to their own practice. This is in line with the first condition of Kemmis and Carr (1986) for successful professional development of teachers. The teachers should problematise their practice so that it has the potential for improvement through participant research.

- It should be participatory and practice-based. This will allow the teachers to construct their own theories about their practice and it will have the potential to highlight the problem of false consciousness. Teachers working together in resolving the tensions and contradictions between personal beliefs and professional practices can provide the personal reflection necessary for meaningful changes in their professional practices. The issues to be researched should emerge from the teachers' practices, and they must be involved in the development of solutions. This will lead to approaches to professional development which dismantle the constructed division of labour between "practitioners" and "researchers". Professional development programmes will accordingly have to be flexible to respond to teacher's needs and to be able to change with them.

- It should be critical, involving an ideological critique of the educational values and assumptions that inform educational policies, resources and practices. In exposing the interests that are served by alternative orientations and emphases in education, teachers can reflect upon the interests served by their own professional beliefs and practices, and be

empowered to make appropriate changes to achieve the educational objectives they prefer.

- It must be community-based, addressing real problems relevant to the community in which they teach. Fien (1991) believes that professional development programmes must encourage teachers to become active members of community organizations that are addressing the problems of the community. This could lead to the breakdown of the divide between school and community that is so prevalent in our society in South Africa.

- It should be collaborative. Working collaboratively with colleagues will facilitate the recognition of false consciousness and institutional influences that may constrain transformative practices in education. Collaborative action is usually more effective than individual efforts in controlling the hegemonic influences that act against improvements in education. In addition to Robottom's five guiding principles outlined above, professional development must be accessible in terms of language and location. In other words, professional development programmes need to be de-jargonised and presented in a medium which teachers can access. Furthermore, such programmes need to be offered at venues which are available to the majority of teachers.

In my opinion, one of the biggest obstacle to these guiding principles for professional development being realized is what Aronowitz and Giroux (1985: 24) bitterly decry as "the disempowerment of teachers at all levels of education." If professional development programmes are to be successful, they will have to address the central issue of empowerment of teachers. The aim of professional development of teachers for me, thus, is summarised by Beyer (1989: 40):

> ...is not to 'train professionals' who will be competent to take over the demands of teaching as these are currently defined and enacted. Rather, the aim is to develop critically orientated, compassionate and impassioned, reflective and socially engaged practitioners who can aid in the process of

> educational improvement and social change; to encourage critical reflection on our own situations and those of our students, our futures and our social responsibilities, that leads to action favouring the empowerment of teachers and a commitment to democracy, equality and autonomy.

3.4 Teacher Empowerment

Gibson (1991) asserts that the word 'empowerment' is currently being applied to a wide variety of phenomena, some of which include: the women's movement (Minkler and Cox 1980), the Black Power movement (Davis 1988), gay rights (Minkler and Cox 1980), empowerment of people with AIDS (Kirp and Epstein 1989), student empowerment (Fagan 1989), empowerment of adolescents (Price 1988), empowerment of teachers (Fagan 1989, Sprague 1992), Education for empowerment (Land and Gilbert 1992), Empowerment evaluation (Fetterman 1993) and empowerment of nurses (American Nurse's Foundation 1989). This popularity derives from renewed interest in the role of power as a key element in social dynamics and relations (Land and Gilbert 1992). At present in South Africa, with the rhetoric of transformation in education high on the national agenda, the concept of empowerment is intuitively appealing to teachers seeking an alternative role in the new educational dispensation, to the traditional one. However, what we need to clarify for ourselves is what empowerment means for us as teachers.

3.4.1 Empowerment: in search of a definition

Intuitively, the notion of empowerment is appealing because of its ethical, psychosocial and political connotations (Kieffer 1984). Gibson (1991) contends that the idea of empowerment is rooted in the social action ideology of the 1960s and the self-help perspectives of the 1970s. It is difficult to define empowerment, and is easier understood by outlining what occurs in its absence: powerlessness, helplessness, alienation, victimisation, subordination, oppression, paternalism, loss of a sense of control over one's life and dependency (Hegar and

Hunzeker 1988, Kieffer 1984, Rappaport 1984 and Shaw 1987). Despite the difficulty of definition and inconsistent use, empowerment is usually associated with concepts such as coping skills, mutual support, support systems, community organisation, neighbourhood participation, personal efficacy, competence, self-sufficiency and self-esteem (Kieffer 1984).

Broadly speaking, empowerment is a process by which people, organizations and communities gains mastery over their own lives (Rappaport 1984). However, Wallerstein and Bernstein (1988) argue that empowerment entails much more than merely increasing one's self-esteem and self-efficacy; it must involve fundamental environmental change.

For this to become a reality, there is a need to comprehend the complex social, political and economic forces that shape people's lives (Butterfield 1990). Katz (1984) views empowerment within a synergistic paradigm, where people are interrelated, resources are shared and collaboration is fostered. Power in the process of empowerment is consequently conceptualized as a condition of being able to achieve some objective in co-operation with others, rather than viewing power as being limited in supply, and therefore needing to be struggled for and defended against others (Watts 1990). In short, empowerment must not develop the individual in isolation of society.

Empowerment is a positive and pro-active process as it focuses more on solutions than on problems. It is also a dynamic concept (Hess 1984) where power is both taken and given. Kieffer (1984) believes that the real issue central to empowerment must not rest so much on having more power as on feeling more powerful. In the process of empowerment, conflict, tension and growth are therefore inevitably inextricably intertwined (Hurty 1984). Furthermore, as empowerment involves a redistribution of power, it can be considered a democratic concept that promotes the advancement of social justice (Hegar and Hunzeker 1988). Kieffer (1984) views empowerment in a developmental sense as a long term

process of progressive development of participatory skills and political understanding. In the final analysis, empowerment is about realizing change as Gibson (1991: 356) cogently argues:

> ...empowerment entails a process of helping individuals develop a critical awareness of the root causes of their problems and a readiness to act on this awareness. This entails a revolutionary, rather than a reformist approach to problem-solving since the focus may be on changing the structure of society rather than simply integrating into the existing structure.

This change can occur through individual change, interpersonal or interactional change or change of social structures which have an impact on the individual (Simmons and Parsons 1983).

Disregarding the problems surrounding a uniform definition for empowerment, Gibson (1991: 359) ventures the following definition of empowerment:

> [It] is a social process of recognising, promoting and enhancing people's abilities to meet their own needs, solve their own problems and mobilize the necessary resources in order to feel in control of their lives.

3.4.2 **Teacher empowerment**

Bolin (1989) defines teacher empowerment as investing teachers with the right to participate in the determination of school goals and policies and to exercise professional judgement about what and how to teach. These views, where teachers have the right to control the curriculum, is foreign to teachers in South Africa. We are accustomed to being treated as 'technicians' (Robottom 1987) implementing a curriculum that has been devised by curriculum 'experts'. A process of teacher empowerment will therefore have to identify the causes of the powerless position of teachers, and strive to address these.

3.4.3 The language of critique: understanding the powerlessness of teachers

The reasons for the powerlessness of teachers is a contentious issue (Sprague 1992). One school of thought, underpinned by educational psychology, tends to analyse teacher powerlessness in terms of teacher personalities or pathologies. In this context, ideologically-laden terms such as *burnout* and *deadwood* are often used to implicate 'under-performing' teachers as individuals with psychological problems (Weiler 1988). In contrast, Sprague (1992) looks at the interplay of political, sociocultural and organisational forces that constrain teachers in their day to day activities. In a similar vein, Freedman, Jackson and Boles (1983: 299) argue that

> [T]eachers must now begin to turn the investigation of schools away from scapegoating individual teachers, students, parents, and administrators toward a systemwide approach. Teachers must recognise how the structure of schools control their work and deeply affects their relationships with their fellow teachers, their students, and their students' families. Teachers must feel free to express these insights and publicly voice their concerns.

Smyth (1987) sees the first step in this educative process of teachers altering the patterns of interaction that characterise and inhibit their social relationships as one of changing the understanding they hold of themselves. To achieve this, Fay (1977) argues that we must create a situation in which teachers can remove the blinkers that have kept them in a powerless position and which have worked against them seeing and acting in alternative ways. Fay (1977: 210) goes further in claiming that this process means teachers moving from a position of dependence to "transforming themselves into active subjects who are self-determining."

However, in order to achieve such a shift, certain constructed constraints have to be overcome. Sprague (1992) identifies these

factors, in relation to the teaching profession, as:

- the feminisation,
- the technologising,
- the deskilling,
- the intensification,
- and the privatisation of teachers' work.

Historically, teaching has never been afforded the same status as the professions of law and medicine, for example (Rury 1989). An overt manifestation of the low esteem in which the teaching profession is held is the fact that the community accepts unqualified teachers to do teachers' work. In 1991, in the Department of Education and Training, there were 13 864 unqualified teachers employed in South Africa (NEPI 1992). In contrast, Shanker (1986) surmises that the community would not allow unqualified medical doctors to perform surgery or do the work of qualified medical doctors. The conditions under which teachers work further reflects the low esteem in which their profession is held. Schools are ill-equipped and inadequately maintained. Sachar (1991) found that teachers do not obtain the books or laboratory equipment that they need to teach. Samuel (1992) views the lack of textbooks and other learning resources as one of the main symptoms of the educational crisis in South Africa.

Below follows a brief synopsis of those characteristics (outlined by Sprague, 1992) which impact negatively on the current role and status of the teaching profession, and which are largely responsible, in my opinion, for our current educational crises.

3.4.3.1 **The feminisation of teachers' work**

In South Africa, most teachers are women and most administrators are men. This assertion is borne out by the following statistics for 1991, used in the NEPI document on *Teacher Education* (1992):

- the enrolment of education students in 1991 consisted of 65% females and 35% males.

- in 1991 in the primary schools of the Department of Education and Training, males occupied 40% of all principalships, 38% of deputy principalships and 30% head of department posts although they made up only 24% of all primary school teachers.
- in secondary schools the gender inequalities are even starker: in 1991 males made up 57% of the teachers in secondary schools in the Department of Education and Training but they filled 90% of the principal posts, 74% of the deputy principal posts and 64% of head of department posts.

Apple (1988) notes that when any field becomes a feminine domain, its prestige is lowered. He further sees a strong reciprocal correlation between a large female component in a given profession and the concomitantly lower financial remuneration for that profession. He argues that this reality is due to the fact that an occupation dominated by women is considered as requiring low skills, thus necessitating control from the outside. Not surprisingly, therefore, the NEPI *Teacher Education* document (1992) identifies the improvement in the status of females in the teaching profession as one of the priorities in teacher education in South Africa.

3.4.3.2 **The technologising of teachers' work**

The technologising of teachers' work refers to Berlak and Berlak's perception (1981: 235) that some academics believe that the "experts in teaching are not teachers but scientifically-trained administrators, or educational scholars who study schooling scientifically". Teachers are consequently regarded as a low status group, subordinated and dominated by the educational 'experts' from 'outside'. This leads to teachers losing control of their labour, since someone outside the immediate situation has greater control over the planning and execution of education (Apple and Teitelbaum 1986). Apple (1988) points out that there has been an increase in this technologising of teachers' work in

recent decades, especially through the reliance on prepacked curricular materials.

As a means to overcoming this negative effect on the teaching profession, Beyer (1989) argues that teachers must not be reduced to technicians whose commitment is to competence, isolated proficiency, and the skilful manipulation of means and ends. Sprague (1992) claims that teacher-pupil relationships suffer when those means take the form of either harsh custodial policies or manipulative behaviour modification strategies. This can lead to teaching skills being reduced to mere behaviour management (Carlson 1987).

Beyer (1989) consequently identifies the following three reasons for rejecting the technicist view of teaching:

- it overlooks the complexity of actual classroom experience. The immediacy and complexity of classroom life undermines the possibility of technical rationality as a dominant force in the fluid, dynamic environments that classrooms exemplify.
- reducing teachers to technicians curtails their possible growth and development as it tends to discourage experimentation, further inquiry and growth-promoting experiences. Teaching, as a result, becomes more and more de-skilled, with fewer opportunities for autonomy and creative engagement with pupils, ideas and materials.
- technologised teaching reduces teaching to an apolitical, uncritical and neutral process that sees political and ideological questions as irrelevant. For those who argue that schools are and should be apolitical, Berlak and Berlak (1981: 253) retort that

> ...all schooling, whatever the content or organisation, however fragmented or unified it may be ...is political. It is political in that it either encourages or does not encourage persons to develop and use their critical capacities to examine the prevailing political, social and cultural arrangements and the part their own acts ... play in sustaining or changing these arrangements.

In this context, Freire (1972) has convincingly argued that a claim of political neutrality is also political, in that it promotes and sustains the existing power-relationships, which, in turn, maintain the dominant political status quo.

3.4.3.3 **The deskilling of teachers' work**

The separation of the design of the curriculum from its execution, due to the technologising of teachers' work, has led to the deskilling of the teaching profession, since it has become largely routine and mechanical (Tabachnick, Popkewitz and Zeichner, 1979-1980). This is an upshot of the fact that after a few years of teaching as technicians, teachers lose their reflective abilities and skills.

3.4.3.4 **The intensification of teachers' work**

The intensification of teachers' work, according to Sprague (1992), refers to the increase in menial tasks which teachers have to perform, under the guise of the imposed professionalisation of their practices (Popkewitz and Lind 1989). This has dire potential consequences for the educational scenario in South Africa. For example, the proposed increase in teacher-pupil ratio in 1996 (40 to 1 for Primary Schools, and 35 to 1 for Secondary Schools) will increase the clerical duties of teachers, which will further sp the teaching profession of its creative and reflective potential. The increase in teachers' clerical tasks also plays a role in exacerbating the privatisation of their work.

3.4.3.5 **The privatisation of teachers' work**

The idea of privacy as a condition in schools in the United States of America was introduced by Lortie (1975). There is general agreement amongst researchers that teachers work alone and collaborate less with colleagues than other professions

(Sprague 1992). Lortie (1975) refers to this phenomenon amongst teachers in two ways:

- firstly, the reality of the teacher alone in a class with the pupils for most of the day could suggest that the privacy (aloneness) of the teacher is an occupational hazard;
- secondly, Lortie found that when teachers had free time, they preferred to do individualistic tasks, rather than to collaborate with colleagues, suggesting a commitment to privacy which extends beyond its structurally-enforced existence in schools[3].

Lortie's observations led McTaggert (1989) to view the privatisation of teachers' work as an imposed ethic of teaching. Shor and Freire (1987) argue that this situation can only be overcome collaboratively. For them, personal (individual) self-empowerment does not exist, as it is always a social act. This is due to their premise that power is always discursively worked out and constantly renegotiated between people in each new context. Theirs is a position with which I concur.

Notwithstanding how these factors, identified by Sprague (1992), which function to disempower teachers, are analysed or understood, they reflect a demoralising condition, succinctly embodied in Giroux's observation (1988: 122):

> ...the current crisis in education largely has to do with the developing trend towards the disempowerment of teachers at all levels of education.

3.4.4 **The Language of possibility: Paths to Empowerment**

Sprague (1992) discusses four paths to teacher empowerment, viz. empowerment through resistance, empowerment through

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[3] i.e. due to the fact that school organisation and governance forces teachers to be alone in their specialised classes with learners for protracted periods.

collaboration, empowerment through shared leadership and empowerment through a transformative vision.

3.4.4.1 **Empowerment through Resistance**

Adopting either passive or active resistance against the forces which have kept teachers in bondage is one of the paths to teacher empowerment. There are various ways that passive resistance can be practised by teachers but the extent to which this practice is in fact empowering is debatable. Kanpol (1988), for example, argues that while passive resistance could be a first step to teachers controlling their own lives at school, it is hardly emancipatory.

The ultimate form of active collective resistance is for teachers to strike. This introduces the concept of teacher unions which are still in their infancy in South Africa. Sprague (1992) believes that teacher unions have much to offer in terms of empowering teachers to take control of their lives. Teacher unions in the United States of America, for example, have successfully bargained for better working conditions for teachers and for them to have more power over curriculum matters (Johnson 1987). The effectiveness of teacher unions, however, has been detrimentally influenced by the lack of consensus about the form that unions must take (Carlson 1987) and by the ambivalence about the appropriateness of unionisation for professionals (Kerchner and Mitchell 1986). In the South African context, the whole notion of collective resistance has not met with much success as it still has to overcome the long teaching tradition of respect for authority that makes it difficult for teachers to take an openly defiant stance against school administrators.

3.4.4.2 **Empowerment through Collaboration**

Sprague (1992) notes that teacher empowerment through collaboration as a means to break out of their isolation and discover their shared conditions, is a dominant theme in the

teacher empowerment literature. Nias (1987) believes that despite teachers need for privacy, they would like to continue meeting after a successful group experience. Such meetings could function to lead teachers towards viewing each other as valuable sources of professional knowledge and support (Yonemura 1986).

However, the extent to which teacher collaboration could be empowering depends on whether there is an enabling infrastructure at their schools (McNeil 1988). An infrastructure of this nature should include strong administrative support, wide and official recognition and a reduction of instructional demands to make time for genuine collaboration amongst teachers. Flinders (1988) argues that without such a support system in place, teacher collaboration degenerates into mere tokenism, rather than being genuine collaboration for transformation.

3.4.4.3 **Empowerment through shared Leadership**

Ashton and Webb (1986) posit that crucial to empowering teachers is precondition of giving them more direct control over their working conditions. Maeroff (1988) concurs with this position in arguing that increased access to decision making is one of the most essential conditions for empowering teachers. However, for shared leadership at a school to be empowering, there has to be a radical transformation in the current autocratic notion of school organisation and governance (Sprague 1992).

3.4.4.4 **Empowerment through a Transformative Vision**

Sprague's (1992: 191) research highlights that a number of critical scholars have argued that unless the basic assumptions of teaching are changed, teacher empowerment via resistance, collaboration and shared leadership cannot suffice to bring about real change. She points out

> [T]hese scholars issue a more radical challenge to the technical rationality and reductionistic epistemology that shape teachers' work. Unless the basic

> assumptions are changed, they argue, acts of resistance can deflect genuine dissent; support groups for teachers can degenerate into gripe sessions that feed cynicism and powerlessness. Even giving teachers a greater role in decision making could just serve to further intensify their labour or to add another bureaucratic layer to the technocratic curriculum. This body of educational literature argues for a complete rethinking of the role of the teacher.

What these scholars are arguing for is a paradigm shift to alternative ways of thinking and doing for teachers, a thesis with which I am in full agreement, since it concurs with the vision I have for the role of the teachers as transformative intellectuals (Giroux 1985).

3.5 **Teachers as Transformative Intellectuals**

A reformulation of the role of teachers as transformative intellectuals necessitates an urgent review of the purpose of schooling in society. The importance of this task is underscored by Harris's (1994: 6) observation that

> [S]chools are powerful agents in the process of consciousness formation and establishing hegemony, and in the present circumstances they are caught up actively in what Whitty (1992) and others have called the 'grand narrative' of the market (p.22). Apple (1992a) has noted that "the results of this 'narrative' are visible every day in the destruction of our communities and environment...in the faces and bodies of our children, who see the future and turn away" (p.27). Teachers educated in a particular way could be well qualified and well placed to help future generations construct a future worth looking towards...teachers can be sufficiently well placed to operate counter-hegemonically and...take an informed counter-hegemonic political-epistemological stance from which to control the educational purposes of the school, and direct those purposes towards the end of rational social reconstruction.

In similar vein, Giroux (1988) defines the role of schools as institutions that must provide the ideology and infrastructure necessary to educate students to function as active citizens in a democratic society. These insights are of obvious importance

to us in South Africa, as we embark on the arduous task of social reconstruction and development.

Aronowitz and Giroux (1985) identify four types of intellectuals in the educational milieu:

- accommodating intellectuals who actively support the maintenance of the dominant social paradigm;
- critical intellectuals who are ideologically different from the dominant ideology but take an apolitical stand as they will not involve themselves in actively trying to change society;
- hegemonic intellectuals who actively provide morale and intellectual leadership for dominant groups in society;
- transformative intellectuals who recognise their own cultural capital and embrace an emancipatory vision for schooling.

Within this framework, Giroux (1985) claims that teaching, rather than being an instrumental or technical process, is a form of intellectual labour in which teachers, as transformative intellectuals, must raise questions about what they teach, how they teach, and the broader social goals they strive to achieve through their teaching. For Giroux (1985), teaching is transformative in that teachers have a moral obligation as reflective practitioners capable of integrating theory and practice, to actually shape "the purposes and conditions of schooling". In this context, Giroux (1985: 379) clarifies the concept of teachers as transformative intellectuals:

> Central to the category of the transformative intellectual is the necessity of making the pedagogical more political and the political more pedagogical. Making the pedagogical more political means inserting schooling directly into the political sphere by arguing that schooling represents both a struggle to determine meaning and a struggle over power relations...Making the political more pedagogical means utilising forms of pedagogy that embody political interests that are emancipatory in nature; that is, using forms of pedagogy that treat students as critical agents; make knowledge

> problematic; utilize critical and affirming dialogue; and make the case for struggling for a qualitatively better world for all people.

Transformative intellectuals occupy contradictory, paradoxical and tension-filled roles within formal education institutions (Harris 1994). They offer alternative discourses and critically social practices which are often at odds with the role of the very institute they work in, as well as the social practices that not only support it but which are also replicated by it. In this regard, teachers as transformative intellectuals are not interested in merely promoting individual achievement or preparing students for a career; they are concerned with empowering students to analyse the world critically in order to free it of oppression and exploitation through the power of struggle and community (Giroux 1985). To be able to achieve this, teachers as transformative intellectuals must create the ideological and structural conditions that will enable them to write and research, and collaborate in developing a vision of the possibilities of autonomy and responsibility.

However, if we as teachers are to realise our function as transformative intellectuals, we need to heed the words of Stenhouse (1975: 142-143):

> ...curriculum research and development ought to belong to the teacher and...there are prospects of making this good in practice...It is not enough that teachers' work should be studied: they need to study it themselves.

One of the pathways to teachers becoming empowered and practising as transformative intellectuals, a process which was followed in this research project, is when teachers become researchers re-searching their own practice. This is one of the ways, I believe, that will enable teachers to bring about the necessary ideological and structural changes in schools, thereby allowing them to teach as transformative intellectuals in developing critical, active citizens.

3.6 **Teachers as Researchers**

Way back in 1929, Dewey argued in his book, *The Sources of a Science of Education*, that one of the most important roles of teachers is to investigate pedagogical problems through inquiry. He could not envisage viable educational research being produced in any other way (Kincheloe 1991). Taking on the role and responsibility of being researchers engages teachers in the dynamics of the educational process, involving them in self-understanding of their practices, especially the ambiguities, contradictions, and tensions implicit in them.

One of the primary aims of teachers as researchers is teacher empowerment. This empowerment involves teachers gaining the skills to interrogate their own practices, to question their own assumptions, and to understand contextually their own situations (Carr and Kemmis 1986) with the aim of improving the rationality and justice of their practice. Change is thus a fundamental goal of teachers as researchers. This links teachers as researchers with Giroux's concept of teachers as transformative intellectuals (see section 3.5).

This type of research, where teachers as researchers practise as transformative intellectuals, is called emancipatory action research. Emancipatory action research is considered one of the most appropriate research methods as a vehicle to empowering teachers, underlying the rationale for its choice as the research method for this research project (see section 2.2.2).

3.7 **The theoretical framework for an analysis of the Research Project**

Against the backdrop of the emancipatory concerns for teachers as transformative intellectuals outlined in this chapter, this study seeks to gauge the efficiency of emancipatory action research as a means to empowering teachers. However, in order to realise this objective, the action research methodology which

underpins this study has to be problematised and critiqued in relation to a theoretical paradigm which articulates the vision of a transformed society and the means required to achieve this. In this respect, Robottom's (1987) guiding principles for professional development (see section 3.3) and Sprague's (1992) language of critique and language of possibilities for teacher empowerment (see sections 3.4.2.1 and 3.4.2.2) form an eminently positioned theoretical basis from which to analyse this research project.

CHAPTER FOUR

WORKING WITH THE METHOD

4.1 Introduction

A chronological and critical description of the various stages undertaken in the current study, barring the first - *Exploring the Problem* (which was discussed in Chapter three) - forms the focus of this chapter. I will first relate the interviews followed by the various workshops, the 'Sensing of the Urban Environment' fieldtrip and the various evaluation sessions.

4.2 The Interviews

The necessity of conducting interviews was underscored by the following reasons:

- to gain access to research participants;
- to ascertain if they saw the need to use the urban environment as a resource in the teaching of ecology;
- to obtain their understanding and background in various areas related to the project;
- for them to be co-constructors of the next stage of the project, viz. the workshop;
- to inform the interviewees about the research project and to give them insight into it; and,
- to find out if they would be available for the rest of the project, having had some insight into it via the interview.

Twenty nine teachers (twenty three biology and six geography teachers) were interviewed[4]. In order to put together a group of

[4] The reason for the few geography teachers interviewed was that they did not readily avail themselves.

participants, I first went to the schools in the vicinity of Belgravia High School (where I teach): Alexander Sinton High, Ned Doman High, Athlone High, Groenvlei High, Spes Bona High, Oaklands High and Garlandale High, where I interviewed the biology and geography teachers. I also interviewed teachers at Belgravia High School. However, I was short of the thirty teachers agreed to in my research proposal[5], and to reach my 'quota' of teachers, I approached teachers whom I knew at schools further away.

Before the actual interview, I gave the interviewees some background to the thesis, explained that the interviews themselves formed part of my research project, shared the aims I had for interviews, outlined how this first interview would be conducted and explained the use of the tape-recorder. The interviewees were given an interview schedule; I then proceeded with the interview by reading the questions.

The schedule of the semi-structured interview, which contained a personal data information sheet, covered four topics: ecology, the urban environment, resource development and topics/activities for the workshops. These articulated a pronounced aim of the study, namely: 'How can we use the immediate urban environment as a resource for the teaching of ecology?' and are discussed below.

4.2.1 **Ecology**

This topic comprised six questions:

1. "How long have you been teaching ecology?"

The group comprised a range of experience, reflected in the

[5] At that stage of the research I was still influenced by my science background, believing numbers validate research findings.

following table:

ECOLOGY TEACHING EXPERIENCE

YEARS EXPERIENCE	NUMBER OF TEACHERS
1 YEAR	2
2 YEARS	5
3 YEARS	7
4 YEARS	3
5 YEARS	4
7 YEARS	3
8 YEARS	4

The group, which reflected a sound blend of 'youth' and experience, included individuals fresh out of college or university with new ideas on ecology and teaching as well as teachers who could share their experiences of teaching ecology. The largest number of teachers had three years ecology teaching experience, and the ideas emanating from them comprised a mixture of new theories and tried and tested ideas. Interestingly, the maximum years of experience teachers had was eight, the length that ecology has formed part of the biology syllabus.

2."Have you done any fieldwork in Ecology?"

Twenty five of the twenty nine interviewees had done fieldwork, this high figure reflecting that they had possibly been involved in ecology workshops prior to this study.

The next two questions were an outflow of question two:

2.1.1."If yes, briefly describe the nature of the fieldwork activities and where they took place."

2.1.2."If not, what are the possible reasons for not doing fieldwork?"

In response to number 2.1.1, the interviewees said that fieldwork had taken place at the following sites: the schoolground, the Liesbeeck river, Dalebrook and St. James beaches, Potberg Environmental Education Centre in De Hoop Nature Reserve, The Environmental Education Centre in the Cape Flats Nature Reserve, Goldfields Environmental Education Centre in the Cape Point Nature Reserve, the Rondevlei Bird Sanctuary and the Houtbay Museum. Except for the schoolground and the Houtbay Museum, all the fieldwork had been done in the natural environment. The following activities took place on the schoolgrounds: 'adopt a plot', development of indigenous garden, pond ecology, soil profiles, senses games and abiotic and biotic identification activities. Even these activities in the school grounds were typical activities of the 'natural' environment.

In response to question 2.1.2, the following barriers to doing fieldwork arose:

- lack of staff co-operation;
- the problem of large classes and pupil control on fieldtrips;
- financial problems since most children could not afford to pay for fieldtrips;
- transport problems due to large pupil groups;
- the emphasis on the examinations and the completion of a 'loaded' syllabus; and,
- the lack of experience in fieldwork.

The geography teachers articulated specific constraints:

- ecology was only a small part of the standard ten geography syllabus and did not have a high examination rating; and,

- time constraints due to the external nature of the examination, which forced the completion of the syllabus in three rather than four terms[6].

On the other hand, a geography teacher who had done fieldwork felt that "We should educate for life and not only for the examinations. We should make time to develop skills and not involve ourselves only in knowledge transfer activities".

3."Environmental Education has been receiving quite a lot of coverage in the media especially on T.V. Do you think there is a relationship between ecology and environmental education?"

All the interviewees responded positively to this question. The next question, which was an outflow of question three, resulted in a variety of responses from the interviewees.

3.1."If your answer is yes or no to number three, please elaborate."

The answers varied from 'ecology and environmental education are synonymous' to 'ecology is part of environmental education' and 'environmental education is part of ecology'. None of the interviewees had had any formal education in environmental education, and this could be a possible reason for the varied responses. This situation prompted the talk in the second workshop (see 4.4) given by Razeena to try and clarify the concept of environmental education.

4.2.2 **The urban environment**

Twenty one of the interviewees had not used the urban environment in the teaching of ecology. Those who had, had used the school

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[6] Some of these teachers, due to the time constraints, depended on the pupils' standard eight biology knowledge of ecology.

grounds and adjacent fields. Although so few interviewees had used the urban environment, the question: "Name a few habitats in the urban environment that can be used in the teaching of ecology" elicited an informed response:

- gardens and backyards of houses;
- open spaces and public parks (Rondebosch Common, Nantes Park, Kromboom Park, Liesbeeck Park);
- the vleis behind Spes Bona High School and in Steenberg;
- the dunes in Mitchells Plain and Belhar;
- the sewage treatment plant in Athlone and Mitchells Plain;
- canalised rivers;
- rivers (Liesbeeck river, Black river and Salt river);
- industrial areas;
- squatter camps;
- the wetlands behind Oaklands High School;
- cemeteries;
- road side verges; and,
- power stations (Athlone Power station).

The next question, "Give possible reasons for not using the urban environment", indicated that many interviewees had not thought of the urban environment as a resource for the teaching of ecology, an indictment of the type of 'training' they had received in which all their fieldwork had taken place in natural environments.

This narrow conception of fieldwork was borne out by the response to the next question: "What is your opinion of the following statement:

> One of the reasons why teachers will be hesitant to use the urban environment is that most literature e.g. textbooks only explain ecology in terms of natural settings.

Most participants agreed with this statement, a result which concurs with the findings of Wagiet (1991) that the textbook is

the teacher's main resource for the teaching of ecology and the conducting of ecological fieldwork. An interesting question raised by one of the interviewees was that even if there were examples of urban setting in the textbook, would these lead to the use of the urban environment by ecology teachers?

The potential benefit of using the urban environment over the natural environment was explored in the next question: "If one could use the urban environment, do you see any benefits in doing so compared to using natural environments[7]." The benefits, which all participants agreed upon, included:

- Children will be able to see the human impact on the environment.
- The urban environment is relevant to the child's daily experience.
- It overcomes the constraints of finance, distance and time
- The urban environment is readily available and the pupils can have many experiences in it, compared to fieldtrips in natural environments which are often one-off experiences.
- A better understanding of the urban environment could lead to community action which is necessary to improve the quality of life of its inhabitants.

4.2.3 **Resource development**

To the question: "Have you used any resources when you taught ecology?" twenty five of the interviewees answered in the affirmative. Their resources included books (e.g. *The outdoor classroom* and *We Care*), literature obtained from Hewat College of Education, University of Cape Town, the Environmental Education Unit at the University of the Western Cape, Cape Nature Conservation and the Science Education Project, videos obtained from the Media Centre of the Education Department, articles in newspapers and magazines and slides.

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[7] As this question is central to the project, it is one of the topics of discussion in the second workshop (see 4.4).

Regarding resource development, only nine interviewees answered yes to the following question: "Have you been involved in a resource development programmes?" However, none of these programmes were of an ongoing nature but consisted, for the most, of one day programmes. These resource development programmes had taken place under the auspices of the Science Education Project, the Environmental Education Association of Southern Africa and the National Botanical Institute. Two of the interviewees had developed their own slide packages, while the interviewees at one of the schools had developed an indigenous garden and a pond. They had also developed ecological worksheets that could be used in the indigenous garden and the pond.

4.2.4 **Topics/activities for the workshops**

Fifteen suggestions arose from the following question: "Are there any topics/activities which you feel must be part of the workshops?":

- Look at the skills required by the teachers to develop and use resources.
- Look at school management problems inhibiting the use of the urban environment.
- Investigate what the urban environment has to offer for the teaching of ecology.
- Find specific venues where ecology can be taught in the urban environment.
- Develop pupil-centred activities.
- Clarify the concept of environmental education and ecology.
- Consider how the Tibilisi principles of environmental education can be incorporated into the teaching of ecology in the urban environment.
- Start a resource centre.
- Look at the human impact on the urban environment.
- Discuss how the life cycles e.g. carbon cycle occurs in the urban environment.

- Workshop cross-curricular approaches in environmental education.
- Engage in projects that can lead to action in the urban environment.
- Make ecological terminology user friendly.
- Look at socially-related urban problems.
- Explore the greening projects at schools.

4.2.5 Commitment to the study

The last question of the interview: "Would you be prepared to be a participant in this research project?" was positively answered by twenty of the interviewees. The reasons for the withdrawal of the other nine was mainly due to time constraints[8].

4.2.6 Personal data

The main purpose of the personal data page was to ascertain the ecological knowledge base of the participants and the source of this knowledge. From the question: "Do you have any courses in ecology?" it was ascertained that no interviewee had any formal qualification in ecology per se. The qualifications they did have formed a part of some other course, for example:

- as part of Geography 111 course at UNISA (one interviewee);
- as part of the Biogeography course at UCT (one interviewee);
- as part of the FITMAST course which is a course for teachers at UWC (one interviewee);
- as part of Botany courses at UWC (eight interviewees);
- as part of M.Sc in Botany at UCT (one interviewee);
- part of Zoology courses at UWC (four interviewees);
- attendance at the 1990 Ecology Summer School (one interviewee).

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[8] i.e. having another job, attending lectures and domestic duties.

Only eleven interviewees belonged to ecological or environmental organisations. Six of them were involved with their own environmental societies at their schools and, to a large extent, had to generate the knowledge base for these; they were not a source of ecological knowledge for the teachers. Three interviewees belonged to EEASA and received the EEASA bulletins and Journals. One interviewee belonged to Botsoc and another used to belong to Environmental Society at UWC when he was a student.

The magazines and journals with an ecological focus that the interviewees read are:

- National Geographic (four interviewees)
- Conserva (one interviewee)
- Custos (two interviewees)
- Spectrum (three interviewees)
- Archimedes (two interviewees)
- EEASA bulletins and journals (three interviewees)
- Enviroteach (one interviewee)
- African Wildlife (one interviewee)
- Veld and Flora (one interviewee)

Wagiet (1995) found that Enviroteach is one of the few pedagogically orientated magazine/journal which covers environmental education available in South Africa.

4.3 **Workshop One**

The participants received two sets of correspondence for this workshop: a hand-delivered notice of the workshop three weeks before it took place and readings for the workshop (chosen by me) a week before it took place. The participants were also telephonically reminded of the workshop two days before the time[9].

[9] This was the case for all the workshops.

This workshop took place at Belgravia High School at 15h15 on Thursday, the 15 April 1993. Eighteen participants[10] (four geography and fourteen biology teachers) from 14 schools attended. All the participants, as was the case at all the workshops, filled in an attendance register (see appendix 8).

The meeting started with participants introducing themselves. They were given two minutes each to state their names and the schools they teach at and to outline any educational project they were involved in. On reflection, this could have been a somewhat threatening exercise for some, since status and egos were involved, and I must think of an alternative ice-breaking exercise for any future workshops.

The second point on the agenda was to decide on the dates and venues of the workshops. As this study did not have the official blessing of the Educational Department, its activities had to take place outside of official school hours[11]. The participants agreed to give up two Thursday afternoons and two Saturday mornings for the project. The dates and venues were decided and agreed on by all the participants (see appendix 4.3 of the notice of the next workshop for the details of the dates and venues). Since I was very wary of the research being labelled **mine**, I was keen to promote the use of alternative venues. The response was so positive that we had two school venues too many for the four workshops.

We then broke for tea which was an opportunity for participants to socialise with each other. These tea-breaks at the workshops played an important role in developing rapport amongst the participants in the group. The refreshments at the various

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[10] This number included me. There were supposed to be 22 participants at this workshop.

[11] The reason for this situation was that I had not applied to the Department for official sanction for this study due to the experience of Wagiet (1991), who had applied for official sanction for her Masters project but only received a reply after she had completed her studies.

workshops were all supplied by the schools or the individual participant hosting the workshop.

The third point on the agenda was a talk on curriculum development and action research. I presented the talk and used overhead-projector transparencies as part of my presentation. The reason for this talk was to share my 'journey' towards emancipatory action research as the research method for this study (see chapter two). In this talk I was not only trying to address the 'how' of action research but, more importantly, also the 'why' of action research. A copy of this talk was sent to the participants with the notice of the next workshop (see appendix 9).

Due to time constraints (it was already 16h40), instead of discussing the complete summary of the interviews, we only discussed the possible topics for the future workshops and the possible constraints we saw in using the urban environment.
To increase participation in the discussion, by mutual consent, we broke into four groups. This I felt created an 'enabling infrastructure' which allowed greater participation compared to plenary sessions which, in my experience, do not lead to more than twenty five percent of the audience participating. The four geography teachers requested to be grouped together. The composition of the other three groups was random.

I did not join a group (I remained an observer of the group discussions) and only participated in the report-back session, since I arrogantly assumed that the participants would allow me to influence their thinking. Furthermore, I was ensnared in the positivistic notion of having to remain objective. This situation persisted for the next two workshops (despite my reflection upon these two reasons for non-participation) after which I became a full participant. This highlighted for me the difficulty of shrugging off one's old ways of thinking and doing. One has to be vigilant and reflect all the time to overcome this problem.

The four groups used the summary of the interviews as the basis for their discussions. I asked them to make a summary of their discussions on a transparency, which they used to guide their report backs. I kept all the transparencies as a data source of the study. After about thirty minutes, the four groups were ready to report back to the whole group. The report-back took the form of a plenary session with each group given an opportunity to report back and the audience able to ask questions. One person reported back for each group and before questions were entertained, I always checked from the other group members if there was anything that they wished to add due to a possible oversight by their presenter. Only the report-backs were recorded during this workshop.

The four report-backs of the possible topics/activities for the workshops and the possible constraints in using the urban environment are outlined below.

1. Group one's report back

Their topics for the workshops were:

- How to develop indigenous natural areas in the urban environment and indigenous gardens at the schools.
- Clarify the concept of urban environment.
- General principles for teaching ecology. Look at general guidelines how to teach ecology more effectively. Why must we teach ecology?

Their Constraints for using the Urban environment were:

- Lack of experience to conduct fieldwork.
- The problem of shifting from teacher-centred to pupil-centred teaching; how to increase pupil participation in our lessons; how to move away from the traditional transmission mode of teaching.

As an outflow on a discussion of the last point in the report-back, one of the participants expressed the following opinion:

"This topic could lead so easily to action by the pupils." He argued that pupils would research their own areas, which are more relevant to them. If there were any problems, this would effect them, and there would be a greater urgency to seek solutions. This could lead to community action, making the pupils vehicles for change.

2. Group two's report back

Their report focused on the development of a resource centre in the urban environment, the functions of which could be to:

- find what is available with regard to the urban environment and where;
- develop worksheets that should consider the following: pupil-centredness; use by different subjects; use by different standard levels; link up with syllabus; take into reckoning that often in the same class we have children from different socio-economic backgrounds.
- be a venue to meet regularly to 'update' resources due to changes in the environment and advancement of information and to learn how to adapt existing resources.

Their constraint was that if the environment changed due to urbanisation, the resources for that site would be lost. This point was opposed by one of the other participants, who argued that such a 'loss' could be a learning opportunity for the pupils to research the effect of change, which, in turn, could lead to community action. Thus the resource can lead to action. The view was expressed that we need to clarify the role of a resource in an educational setting and we need to learn certain skills with regard to resource development which will allow us to adapt the resource if needs be.

3. Group three's (geography group) report back

This group's first topic had been stimulated by the talk on curriculum development and action research, and focused on the questions of who should develop the curriculum at school: a department at the school or the whole school? This group believed that the whole school should as they believed that environmental education is the domain of all subjects, and not only as often believed by our colleagues that of the biology and geography teachers. In this light, they felt we needed to understand curriculum development more clearly.

Other items in their report-back included:

- Looking at the impact of rapid urbanization on the environment, especially the effect of 'squatter' camps.
- Clarifying the concept of Environmental education and ecology.
- Making ecological terms user-friendly.
- Looking at the position of ecology in the school's curriculum. When should ecology be taught? They felt there should be a developmental approach to ecology from standard 6 to standard 10 and not the disjointed position of ecology from standard to standard as is the case at present.
- Discussing the teaching of ecology in a co-ordinated fashion by the different subjects (geography and biology).

Their only constraint was teacher apathy and the ignorance of the importance of ecology and environmental education amongst teachers.

4. Group four's report back

Their suggested topics for the workshop were:

- Clarify the concept of environmental education and ecology.

- How can the Tibilisi principles be applied to our teaching?
- What has the urban environment to offer the ecology teacher? They felt we needed to look for specific sites for teaching ecology in the urban environment, and had to go on a sensing the urban environment trip.
- Determine the necessary skills we, as teachers, need to develop our own resources, and use them effectively.

At this stage it was already too late to address the last point on the agenda: negotiating the agenda of the next workshop. I therefore asked the meeting for a mandate to plan the agendas for the next workshops, using their report-backs as my parameters. The meeting unanimously agreed with the proposal. With this, the workshop came to a close at 17h30.

This first workshop proved to be 'learning by doing'. On reflection, I realised that we had tried to cover too much in this workshop.

4.4 **Workshop Two**

This workshop took place on Thursday, 22nd of April at Groenvlei High School. The workshop started at about 14h40. Twenty two participants attended (4 geography and 18 biology teachers). It was the only 'full-house' workshop, possibly because teachers felt the need to talk to each other about the retrenchment situation[12].

The workshop consisted of:

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[12] The workshop took place under the cloud of teacher retrenchment. The schools had received their new staff quotas on the Monday of that week. All the schools involved in the study had to retrench staff members. The school of the venue of the workshop had to retrench 12 teachers, and was having a staff meeting to discuss their teacher retrenchment problem while we were having our workshop. Retrenchment dominated the tea session and discussions after the workshop.

- A talk by Razeena to clarify the distinction between ecology and environmental education (see appendix 10).
- A talk by Chris[13] to clarify the differences/similarities between the urban environment and the rural environment.
- A workshopping of the topic: 'Why should we use the urban environment?'.

After the talk by Razeena, a lively debate ensued. We concluded that ecology is part of environmental education and not the same thing, and is much more complex than we had originally thought.

The talk by Chris was followed by intense discussion around the blurred distinction between rural and urban environments, brought about by the mushrooming of informal settlements in cities and on their outskirts, and the criteria necessary to distinguish between them. We did not reach consensus but eventually decided that an urban environment is socially constructed by humans to meet human needs, and is characterised by high population density and predominantly secondary and tertiary industrial activities.

The workshopping of the topic: 'Why should we use the urban environment?', which was done in four groups (the geography group and three biology groups), was an important exercise for us to break away from being 'technicians'. We had to clarify for ourselves **why** we should use the urban environment, if at all, thereby moving away from asking only 'how' questions to asking 'why' we do what we do. We were improving the understanding of our practices with the aim of improving our actual practise.

The last part of the workshop consisted of the four report-backs. The first group's reasons for using the urban environment were:

- Many of the environmental problems are centred in the urban environment due to high density human impact on natural resources and other needs.
- It is the environment that our pupils identify with.

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[13] Razeena and Chris are research participants.

- Problems in the urban environment have a local - global impact pattern.
- People should be made aware of the slow recovery rate of disturbed areas so that they realise the effects of their potential actions.
- Urban diseases are due to high population density and poor housing conditions. Elsies River on the Cape Flats has the highest T.B. incidence in South Africa.

The second group's reasons were:

- You are able to teach in the context of the community e.g. social, economic and political.
- Political issues of conservation of natural open spaces in urban areas for recreation could lead to values clarification.
- Problem of the expectations of the lower income group, politically marginalised communities and land allocation in the urban environment could be examined.
- Ideal conditions to overcome the constraints of distance, finance and time were provided.
- Provides resources to teach certain ecological concepts.

This third report-back overlapped, to some degree, with the other two groups as can be seen by their report:

- awareness about how humans impact on the environment;
- development versus conservation issues and the need to marry the two;
- political relevance as one can look at the differences between the franchised and unfranchised urban areas and discuss how the 'playing fields' could possibly levelled in a New South Africa;
- urban environments being accessible and cheap to access;
- the need to encourage pupil participation and responsibility in real-life issues, which could be an impetus for action;
- act locally but to place issues in global context, otherwise they could lead to a narrow focus; and,

- the urban environment easily lending itself to a cross curricular approach, involving other subjects by looking at a urban environmental issue that effects the pupils directly.

The last group's reasons were:

- We live there, and so it is relevant.
- Could lead to preventative action.
- Accessible and cheap to use.
- It is a known environment for the pupils and the explanation of abstract ecological concepts using this 'known' environment could bring these abstract concepts into the grasp of the child.
- Lends itself to problem solving activities of 'real' problems.
- social problems such as gangsterism and informal settlements can be addressed and placed in context.
- Highlights the effect of urbanisation on the natural environment.
- Effects of acid rain on rocks and buildings are dealt with.

One of the issues we clarified during the report-back session was that we were not doing urban ecology; rather, we were examining how we could teach ecology using the urban environment. The reasons that emerged for this went much further than those given by Hale (1986). While she only focused on traditional educational reasons, we were more concerned with the political and social aspects.

The workshop ended about 17h30 with us being unable to do an evaluation of the workshop due to it being so late.

4.5 **Evaluation session one**

This first evaluation session took the shape it did due to the fact that we had been unable to hold evaluation sessions[14] after the first two workshops due to time constraints. I went to Ned Doman High School on 29 April when I had two consecutive free periods and met the three research participants who taught there. The evaluation took place in a classroom while a rally involving all the pupils and the staff of the school was in progress on the school grounds. The evaluation session did not last long due to the volatile situation on the school grounds. Once again the dedication of the participants to the project was underlined by them leaving the rally to be part of this evaluation. In the short time at our disposal we could only discuss four questions.

The first question: "Did you feel out of place in the presence of so many biology teachers?" was directed at the geography teacher. I was trying to ascertain if the geography teachers had in any way felt intimidated by the large number of biology teachers, possible resulting in them not participating fully in the workshops. This possibility was dismissed as he stated:

> After the first meeting, I felt that this was all about biology and I asked myself what I was doing here as a geography teacher. However, after a few days of reflecting over the issue, I came to the conclusion that this was not all about biology but about action research and how this process can help us to understand our practice.

With the second and third questions: "Do any of you feel that this is my project in the way the workshops have been run?" and "Do you feel that I am leading the workshops in a particular direction?" I was trying to find out how they saw my role in the workshops.

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[14] i.e. outside of the evaluation with my two critical friends.

Generally, they felt that I had not pushed a particular line and that my agenda, with its focus on collaborative curriculum development, had always been up front. They also felt that the entire process had been participatory and democratic in that the shape and direction of the workshops had been collectively negotiated.

The last question: "How can we improve the mechanics of the workshops?" resulted in only one improvement being suggested. They felt that during the report-backs, all points must be recorded (even those which may seem similar) in order to increase the quality of our 'meaning making'. The evaluation session ended with cries of "Amandla" in the background.

For me, this session reiterated the benefits of having more than one participant from a school involved in the project:

- if you want to introduce an innovation at school, you are not alone and you can discuss the development with the other participants at the school; and,
- it allows you to discuss the workshops a day or two later, thereby functioning as an inbuilt reflective mechanism.

4.6 **Workshop Three**

This workshop entailed three different sessions due to poor attendance[15] at what was supposed to the entire workshop held at Westridge High School on 6 May. The second session took place on 19 May at Belgravia High School and the third was held with one participant at his home since he was very ill.

[15] One of the participants had notified me prior to this workshop that he was dropping out of the project, since no classes had taken place at his school for the past weeks, due to the educational crisis. Consequently, he had to teach his standard ten pupils after school and on Saturday mornings when it was 'safe', times which clashed with the workshops.

4.6.1 Workshop at Westridge High School

The workshop took place at Westridge High School in Mitchells Plain on the afternoon of 6 May 1993, the afternoon of a very important SADTU meeting regarding teacher retrenchment, also in Mitchells Plain, and was attended by nine participants (including myself) representing eight schools. All the participants were biology teachers.

After the workshop, I telephonically contacted the absent participants to inquire why they had not attended. Their reasons were illness, transport problems, personal problems, picketing (teacher retrenchment), the SADTU meeting, a change in sporting fixtures, arranging their De Hoop Nature reserve trip for the next day (7/5/93) and attending staff meetings about retrenchments. This low attendance I saw as part of doing research in the 'real world' with 'real' people.

Once again, we could not follow the proposed agenda as we only had time to discuss the question, "Why do we teach ecology?". Although this was the only workshop that ended with an in depth evaluation session, due to time constraints we could not look at factors which may impede the implementation of the project. I also once again realised that we can only do justice to one topic per workshop. As a result, subsequent workshops all only focused on one topic.

The workshop started with a talk given by myself on the aims of education and teaching and the role of resources in education. We then broke into two random groups of four each. I did not take part in the group discussions, which looked at the aims of teaching ecology.

The first groups reasons for teaching ecology were to:

- develop communication and language skills;
- develop critical thinking;

- develop such skills such as data collection, observation and interpretation;
- increase awareness of environmental issues;
- let pupils have fun during the study of ecology;
- make pupils aware that they must be accountable for their actions in the environment; and,
- promote pupil participation in the learning process.

One of the points that led to much discussion was 'critical' thinking. We felt that issue-based, solution-driven teaching is a possible route for the development of critical thinking, provided that we questioned our assumptions in order to lead to responsible and accountable action.

Another problem that the group identified was that at junior primary level at school there is an integrated approach to classroom practice; however, higher up there is a reductionist approach to knowledge which makes it problematic for the child to see the world as a whole.

The second report-back was based on a project at Westridge High School, where the pupils were investigating a particular odour in the air at the school, the origin of which was the Sewage Plant in Mitchells Plain. The groups of pupils had to work together (developing social skills) to look not only at why and who was causing the pollution but also at whether pollution should take place at all. They then had to present their findings to the class (developing the skill of public speaking).

This project provides an example of a pedagogical approach where the teacher created an enabling context in which the learners could develop various skills which could be translated into social action if they felt it was necessary. This is in line with the following views expressed in the workshop:

> We need to develop an educational resource that allows the child to develop. The main aim of a resource should not be the transfer of knowledge but the development of the child.

However, in order to achieve this, we need to interrogate our practices by asking questions like: How do our pedagogical encounters affect the learners? Is their self-esteem improved? Has their knowledge base improved? Have their communication skills improved?

4.6.2 **Lesson to learn from the low attendance**

As the workshops were held after school hours, experience showed me that they should not be held on consecutive weeks, as this would facilitate the holding of repeat workshops. This need arose from the fact that the current research amounted to a professional development programme. Thus, the absence from one workshop could lead to a 'void' in the understanding of the project and further participation could be problematic. Luckily for this project, due to the many holidays, we had not scheduled the workshops for consecutive weeks.

4.7 **Evaluation Session Two**

The questions that led the discussions in this evaluation session were not preplanned but emerged as the session progressed. The first question to emerge, and which was posed to the group, was: "Who owns and controls the project?" After some debate, they came to the conclusion that, although I had identified the research area and had initiated the whole process, thereafter it had become a joint venture with collaborative decision-making as to the future shape and direction of the study.

The next question to emerge: "Do I dominate the project or steer it in a particular direction?" met with a negative. Each group felt that it had sufficient autonomy and independence to make its desired impact. Besides which, it was pointed out, that all decisions had been collaborative and consensual.

The third question: "What is good about the workshops?" indicated that they had created the opportunity to meet other teachers and share views. The response to the fourth question: "Did the different academic backgrounds of the participants intimidate you and influence your participation in the project?" is summed up by the personal revelation of one of the participants:

> Initially, yes but this changed as the process developed ... realised that we were talking about teaching and that is everybodys' day to day activities...I no longer saw myself as only coming to learn but also to share my experiences of teaching...not only coming to receive but also to contribute to the debates.

This perception is underscored by the following emphatic statement by one of the participants who articulated the changed view we were having of ourselves: "Something we must all realize is that we are all resourceful."

A criticism regarding my 'control' of the presentation of the talks before the workshop arose from the fifth question: "How can we improve the running of the workshops?" Some participants felt that I should have asked for volunteers to lead discussions after we had identified the eight topics. On the other hand, others in the group felt differently and said that they would have been scared off if they had had to present. The possible reason for this opinion is summed up in the following view:

> This cannot happen after one meeting. I need to feel relax with the group. It took me a couple of meetings to realize that we are all seeing this process as a learning experience.

Personally, I feel that I did not create an adequate learning opportunity for the group by failing to ask if anyone wanted to lead the discussions. Given the opportunity, I would discuss this issue with the group and find out who would be willing to lead a discussion, and when, during the programme.

The sixth question: "Why did you join the project?" resulted in responses ranging from 'the topic was topical' to 'because we

know you'. My previous involvement in teacher workshops played a role in participants joining the project as stated by a participant:

> You knew most of the people due to your previous activity. It played an important role in me joining the project. If somebody from Westerford High (a school that he had had no prior interaction with) had phoned me, I would not have joined.

The next question: "How can you justify giving up three hours for this workshop while there are important meetings taking place discussing the educational crisis?" met with a variety of responses. One of the views aired was that we need a healthy environment otherwise a new Education system would have no meaning to the daily lives of the pupils. Another opinion was that as teachers

> [W]e must prepare ourselves for the new South Africa. I want to be part of the development of the new curriculum. These workshops are preparing me to be able to play this role in the new South Africa. In the workshops we are learning many things quickly. The articles and the talks are very helpful in this way.

All of us agreed that we needed to be part of the political struggle while simultaneously involved in activities like this project because

> [T]his project is very important...My concern is that the same people are going to be in control of education in the new South Africa. Our voices must grow so that we can challenge the status quo...I see what we are doing as being part of the 'struggle'.

The feeling that what we were doing was important was endorsed by the view that we should at a later stage create structures to continue the work we were doing.

This workshop and evaluation session really brought home to me that numbers are not central to the validation of a discussion. We were a very small group but the quality of the discussion had not been 'diluted' by this factor.

This workshop closed on a high note as the participants felt that we had achieved quite a lot, despite the clouds hanging over education.

4.8 **Workshop at Belgravia High School**

A day prior to this repeat workshop[16] (18/5/93) SADTU had announced that teachers would go on strike on the 24/5/93 if their ultimatums regarding teacher retrenchments were not met by the government. Nine participants attended this workshop, making a total of ten (two geography and eight biology teachers), representing seven schools.

I presented a talk similar to the one I had given at Westridge High School. We then divided into two groups of four and five individuals to discuss the aims of ecology. I did not join the group discussions.

The first group's report-back did not answer the question as they gave an approach to teaching ecology and not the aims of teaching ecology (see appendix 11).

The second group's aims for teaching Ecology were:

- to promote environmental awareness;
- for the pupils to understand the interrelatedness of humans and other organisms - that humans are not superior to all forms of life on Earth but are co-inhabitants;
- to develop a variety of skills in the child, such as cognitive, motor and affective skills;
- look at the pros and the cons of economic development.

This group's overarching aim was to develop responsible lifestyles for themselves and amongst their students.

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[16] See section 4.6.

This group also discussed different types of resources, the most important being human - the pupils and the teacher. Other resources included:

- worksheets and packages, which had to be continuously evaluated;
- fieldtrips and excursions; and,
- audiovisuals, films and slides.

After the report-backs, I posed the question: "How do we see a resource now?" This led to a lively debate, focusing on whether we could attain these aims of ecology by using resources in the conventional way: viz. to impart knowledge only. All of us agreed that a resource should be part of a process of developing the abilities of the child and not an end in itself. We felt that a resource must allow the pupils to become researchers, that they must be given the opportunity to realize that they can construct their own meaning and that this meaning is valid. Via this process they could develop self esteem and realize that knowledge is socially constructed.

However, various problems were raised regarding the implementation of this different view of a resource, summed up in these perceptions:

> ... biology teachers emphasis the bio/physical environment and not the socio/political environment. I see a problem with the development of resources for the socially constructed environment as teachers are not use to teaching ecology in that environment.
>
> I see a problem of evaluating attitudes or social responsibility. We are used to marking 'knowledge recall'.
>
> The constraints of the syllabus and the examinations are impediments to realizing these views. We need to change the content-driven curriculum and how we evaluate.

It transpired that one of our biggest problems as teachers is that we believe that we must know everything. We had accepted our role as the "jug" and the pupil as the "mug". It was felt that

we must teach our pupils "how to learn" so that they could discover the world for themselves.

The time was 17h20 and I asked if we could have a short evaluation session. The participants agreed.

4.8.1 Short Evaluation

Due to the time we only addressed one question: "How do you feel about this workshop and the process up to now?" There was an opinion that we were theorising too much in the workshops, instead of getting down to the practicalities of teaching. However, there was also the opinion that this theorising was important since it gave us "a picture of where we can go to", and that practical application would follow in the next stage of the process (Sensing of the urban environment) which we had agreed upon. It was at this stage that we could "look at the resource and ask which skills it is developing in the child". In this regard, we realized that if we were to determine our destiny in our teaching, we needed not only to know how to achieve this but, more importantly, why this had to be achieved. Theory, we thus felt, was vital.

The evaluation session ended with a concern for the future of education in a new South Africa. We realized that the curriculum had to change to implement these ideas. And, although our assumption that in the near future there would be one curriculum with the various provinces contextualising their own core transpired, our concern was that a business as usual approach could easily be adopted if the wrong people represented us (teachers) on the curriculum transformation committees. We felt that we needed teachers with educational insights who could be a strong voice for us on these committees. We thus needed to equip ourselves to be able to perform such tasks, and saw these workshops as a start to addressing this need. With this concern articulated, the workshop ended at 17h40.

This workshop highlighted an interesting problem due to the first group's report-back (them not understanding the question). It had been naive to think that one workshop could address this topic, so initially I thought that we needed to have a facilitator in each group when we discussed such theoretical topics to overcome misconceptions. However, on further reflection, I realized if we had facilitators this 'overcoming' would not have happened and we would not have become aware of this situation. I now believe that we must allow the participants to construct their own meaning so that we can deconstruct it with the aim of reconstruction for transformation.

4.9 **Talk with Chris**

This formed the third repeat of workshop three (see section 4.6). I gave the 'education' talk to Chris at his home on 20 May. Prior to this talk he had already developed his resource for the Saturday's fieldtrip looking at the wetlands behind Oaklands High School. After the talk he indicated that he was going to change his resource. He gave me both resources (see appendices 6.5 & 6.6). The initial resource had been typically 'show and tell', concerned only with the transmission of knowledge. The reworked resource was dramatically different in that it looked at a variety of activities that the pupils could engage with in the wetlands and the skills that these could develop in the child.

4.10 **"Sensing the Urban Environment" fieldtrip**

This excursion took place on Saturday 22nd May and the group comprised seventeen participants (two geography and fifteen biology teachers) representing fourteen schools.

The aim of this event was twofold: to address a need voiced by the participants that they did not know what the urban environment had to offer for the teaching of ecology and, secondly, to provide an opportunity for the participants to

present a topic to the group as part of their personal growth[17]. Some participants worked in groups (common interest) and others individually. All of the participants had visited their sites before the excursion and took great pride in their presentations. Some of them had prepared a handout of their presentation (see appendix 6.1-6.7) for the group.

We all met at Hewat College of Education and left at 8h30 in a mini-bus sponsored by Shell (see appendix 12). We followed the route set out in the notice.

4.10.1 **Nantes Park: Public open space**

This open, public park is near to a number of our schools, and includes a river as well as variety of environments in which to carry out ecological activities.

The presentation at this venue was given by Billy, who gave a holistic approach to the use of the Nantes Park. He looked at the park from the following viewpoints: physical, biological, social, economic, cultural, historical and political. Billy gave each one of us a handout in which he suggested a variety of activities under the above headings (see appendix 6.1). In his presentation he discussed a number of the possible activities on the handout. During his pre-fieldtrip he had spoken to a number of the people living around the park to elicit their opinions with regard to the park. They were not in favour of the park for housing and felt strongly that it should remain a park.

Billy had set a very high standard with his presentation and this could have unsettled some of the participants as they might have compared their presentation still to come in the light of this high quality start to the fieldtrip (see comments in 4.10.10).

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[17] This arose from one of the points discussed during the evaluation session at Westridge High School that after the eight 'points' had been identified for the agendas of the workshops, the participants should have been given the opportunity to present any of these topics (see section 4.7).

4.10.2 **Vygieskraal Squatter Camp**

Razeena and I presented our research on this squatter camp, which is situated next to Belgravia High School. I had been introduced to the chairperson of the squatter camp committee via the Afrikaans standard ten pupils of our school who were involved in a feeding scheme for the children of the squatter camp. As a result, I had arranged with Murieda, the contact person at the camp for our fieldtrip, that we could come into the squatter camp and that she would talk to the participants during this fieldtrip. On arrival, the group walked through the squatter camp as I told them that they should feel relaxed as they had been 'invited'. I asked them to observe as much as possible and indicated that they would be able to direct their questions to Murieda after she had given her talk. Murieda gave her talk in the presence of the squatter committee. She gave a short history of her family and her life in the squatter camp. She impressed us with her strong will and the willingness of the squatters to try and do something for themselves. For example, they have started a creche and are in negotiations with the city council to improve their situation. Murieda's talk was followed by a barrage of questions from the participants which she tried to answer to the best of her ability. We gave each participant a handout which contained some data regarding 'squatter camps' as well as possible teaching activities and the skills these could impart. A possible project and methods for its implementation were also given (see appendix 6.2).

This fieldtrip was a very humbling experience for all the participants as it touched our social consciences. I personally had not been to a squatter camp before the previous week, and had to ask myself to what extent I had allowed myself to be indoctrinated by the media about squatter camps. I realised that these are people with hopes, dreams and needs like anybody else and not 'squatters' as portrayed in the media. We also felt that a more appropriate term for squatter camps would be "informal settlements", as most of the occupants of these camps are South

Africans and not illegal immigrants. We also concluded that the 'squatter' problem needed to be addressed urgently since, with the current influx of 4000 people per week coming into the greater Cape Town area from the rural areas (*Cape Argus*), 'squatter camps' would form the bulk of the urban areas of the future.

4.10.3 **Canalised River**

Running past the Vygieskraal squatter camp and Belgravia High School is a canalised river. Fazela and Max, who are at different schools, gave this presentation with the aid of a handout (see appendix 6.3). Prior to their preparation, they had gone further up and further down the river, and had compared this part with the other parts of the canalised river. The most striking factor we noted was the effect of pollution due to the industrial complex on the other side of the canal. Max discussed two teaching activities that could take place at the canal: the effects of pollution and the study of plant life.

This presentation differed from the first two in that participants started to become 'unofficial' co-presenters with Max and Fazela. They had started to feel free to add to somebody else's presentation.

4.10.4 **Industrial area**

Next to Belgravia High school is an Industrial Area. Regan had prepared this presentation on his own due to logistical problems in working with Vincent from another school. He had prepared a handout but due to unforseen circumstances he could not be part of the fieldtrip. We thus did not go into the industrial area but each participant was given the handout, which outlined four possible teaching activities for the industrial area (see appendix 6.4).

4.10.5 **The Dunes**

The dunes are situated next to Westridge High School in Mitchells Plain. Keith and Muzaina from different schools prepared this presentation. Keith gave an initial talk before he took us on a circular walk of the dunes, which, he noted, could be used for standard eight ecology and certain of the standard nine work. Prior to this, the main use of the dunes by the school had been for athletics training. This was borne out by Keith's comment:

> Yesterday was the first time that I had come to the Dunes to look at how we could utilise them as a resource in the urban environment for the teaching of ecology, after having run up them for nearly all my life (16 years).

Donny had accompanied Keith on their pre-fieldtrip preparation. They had been amazed by the potential the Dunes held for the teaching of ecology. Keith and Donny had had four standard ten pupils with them on their pre-fieldtrip, who were just as amazed by the 'looking and seeing' experience, as they, like Keith, had been up and down these dunes so many times before. Along the walk Keith showed us various interesting sites, ranging from the informal settlement on the dunes to pristine patches of fynbos vegetation. In the spirit of collaboration Billy, Bersan and Max all added to the presentation.

4.10.6 **Rondevlei Bird Sanctuary**

Colin gave a talk on the uses of the Bird Sanctuary for teaching before he took the group on a walk of the place. At this juncture we were running late and I asked him if he could cut his walk to 10 minutes. He ignored the request and used about 30 minutes as he wanted his 'pound of flesh'. He felt he had prepared and wanted to share his new insights about the place. He had visited the place prior to our visit and had made the necessary arrangements for our visit.

Rondevlei Bird Sanctuary is surrounded by the Grassy Park housing complex, and is in walking distance of a number of schools. It is the leading ornithological field station on the Cape Flats and had been built to conserve the rich bird life at the vlei. Its focus has shifted to include the conservation of indigenous fauna and flora, and doubles as a place for the enjoyment of people looking for peace and quiet. In addition to bird life, there are a number of mammals e.g. mongoose, grysbok, spotted genet, otter etc. The sanctuary also has a museum, a small auditorium and a resource centre for indoor activities for rainy days.

4.10.7 **The cemetery**

Lesley gave a talk at the Grassy Park cemetery. We found, however, that our cemeteries do not have the same potential for teaching ecology as those in Britain, for example, with their long histories. In addition, most of us felt uncomfortable with the idea of teaching ecology in a cemetery.

4.10.8 **Acacia veld**

This presentation was also given by Lesley. The Acia veld of alien vegetation is situated behind Fairmount High in Grassypark. We discussed the ecology of alien vegetation and the impact of humans, especially pollution, on the area. It was generally agreed that while we need to address the symptoms of pollution, more importantly, we had to address its root causes.

4.10.9 **Contrasting housing complexes opposite Fairmount High**

Lesley was, once again, the presenter. The school's pupil population comes from the two contrasting suburbs which surround the school. The one is a sub-economic housing complex with Afrikaans being the main language; the other is more affluent with English predominating. There is high unemployment in the

sub-economic area. The facilities in the two areas are world's apart, as is their respective ambience.

Lesley felt that it was important for pupils to ask questions such as: "Why the difference?" and "Should it be like this?" He pointed out that we glibly talked about the total environment comprising the bio-physical, social, economic and political environments but in our day to day teaching we stayed with the bio-physical environment. He stressed that we must realize that the bio-physical aspects of the environment does not alone influence the child; it is the social and economic environments that have a greater impact on the lives of the inhabitants, and these need to be interrogated in our teaching.

4.10.10 **Evaluation Session One during the fieldtrip**

During the fieldtrip we held three evaluation sessions with different participants. The number of participants in an evaluation sessions varied, depending how many were together in the given situation. My aim in following this format was to 'capture the moment' in which we were and to offset time constraints. The questions asked during these evaluation sessions were not pre-planned but emerged as the evaluation session developed.

We had our first evaluation session in the bus on our way to Oaklands High School, and comprised six participants excluding myself. We only had time to debate three questions. To the first question: "How have you found the fieldtrip so far?" the responses were all positive, as can be seen by the following responses:

> ...very good...The potential of Nantes and the squatter camp for me was very interesting.
>
> For me it started on the pre-fieldtrip excursion...going to the Rondebosch Common and observing more than I had ever seen before.

> I feel that we have been sitting in the classrooms during the workshops and talking about it and now it has become a reality...talking about it is one thing but doing it is another. I have now realized how much time we have already wasted in not utilizing the urban environment. My perception what the urban environment has to offer has radically changed.

The second question: "Did you find the idea of having to present threatening?" I directed at first year teachers in the group. The response of one of the participants was very interesting:

> Toe ons veroggend begin het, het Billy 'n 'excellent presentation' gegee. Toe staan ek en wonner hoe gaan my 'presentation' lyk in vergelyking. Ek weet dit moet nie so wees nie maar ons is nie gewont om vir ons kollegas iets aan te bied nie. Toe kom ons by die 'squatter camp' en dit was meer opwindend as Nantes vir my. Toe dink ek hoe gaan die Dune nou lyk na hierdie twee 'presentations'. Maar wanneer Billy so opgewondend geraak het oor daardie bossie op die dune toe voel ek dat ek het iets bygedra tot die 'fieldtrip' en ek het goed met myself gevoel. So, oorspronklik was ek 'threatened' maar die reaksie van die group en my voorbereiding het 'n groot rol gespeel om my op my gemak te sit gedurende my 'presentation'.

All the participants agreed that we were addressing the question posed by the participants in the interviews: "What has the urban environment to offer for the teaching of ecology?" Although some of us were aware of certain sites in the urban environment, we had not been aware of their potential for the teaching of ecology, a reality which is definitely being addressed, borne out by this observation: "...thanks to this project we are aware of the potential of different areas for the teaching of ecology."

We had to end this evaluation as we had arrived at our next site.

4.10.11 **Wetlands**

Chris presented his talk in the grounds of Oaklands High School, behind which (during winter) is a wetland. He handed out a document outlining potential teaching activities afforded by this site and the skills these could impart. He gave a detailed

description of a long-term study on seasonal rhythms he was involved in with his students. Another topic he raised was that the Wetland lends itself to discussion around the controversial issue of filling in wetlands for housing which, in turn, provided a catalyst for values clarification exercises.

4.10.12 **Evaluation session two during the fieldtrip**

As we were walking to the next site on Oaklands High School grounds, I had an evaluation session with two participants. We could only address two questions in the short time at our disposal. To the first question: "Did this fieldtrip address the question: What does the urban environment have to offer for the teaching of ecology?" both participants responded positively:

> Yes, this process has proven to me that there is so much that we can do in the urban environment. The possibilities are endless.
>
> ...the highlight for me was the exposure to the squatter camp...I was also made aware of the variety of sites where I can take my students.

To the question, "Did you feel threatened by the idea to prepare for this presentation?" they responded negatively, saying they knew the other participants after having interacted in so many workshops. They felt that it was important to feel at ease with the rest of the group before presenting. In their opinion, these presentations had come at the right time as we knew each other and we had all realized that we were prepared to learn from each other.

4.10.13 **Schoolgrounds**

This presentation was given by Claudine and Mark in the schoolgrounds of Oaklands High School. Claudine had found preparing for this presentation very revealing:

> I have been walking everyday on the schoolgrounds and did not really realize the potential until now when I was forced to prepare for this presentation.

In the discussion that followed the presentation we realized the endless potential of the schoolgrounds for the teaching of ecology. We also realized that using the schoolgrounds would overcome a number of constraints we normally have with fieldtrips such as a lack of money, time and being able to do on-going projects.

Due to the time negotiated for this fieldtrip (8h00 to 13h00) we could not fit in the last two sites, viz. the Rondebosch Common and the Liesbeeck river. We did, however, receive the handouts that the two groups had prepared for their presentations.

4.10.14 **Evaluation session three on the fieldtrip**

This evaluation took place in the bus on our way home to Hewat College of Education and involved four participants. We only discussed three questions in this evaluation session. As in the previous two evaluation sessions on the fieldtrip (see 4.10.10 and 4.10.12), the participants all agreed that the fieldtrip had addressed the question posed: "What has the urban environment to offer for the teaching of ecology?"

To the second question: "How did you feel about working with other participants in preparing your presentations?" the participants all said they had felt that it was a good thing, summed up in this observation: "...If you went alone to prepare, you would not have seen as much as we saw as a group". The last question, "Did you find the idea to come and present threatening?" elicited similar responses as in the previous two evaluation sessions (see 4.10.10 and 4.10.12). Initially, some of them had not felt comfortable but their in- depth preparation and the relationship in the group had made them more relaxed and at ease, even confidant. This evaluation session came to an abrupt end when the bus pulled up outside Hewat College of education. This signalled the end of the 'Sensing the Urban Environment' fieldtrip which, from all accounts, had been a resounding success and an immense eye-opener.

4.10.15 **The evaluation session after the fieldtrip**

This evaluation session took place in my car as we were waiting for the lift of one of the participants. All the other participants had already left, except myself, my two 'critical friends' and the other participant. We discussed the fieldtrip and planned the next workshop. The evaluation discussion of the fieldtrip endorsed the views expressed in the three evaluation sessions during the fieldtrip. With regards to the sites we visited, one participant felt:

> The only thing that did not come out strongly outside of the squatter camp was the social issues. I see people are still looking for natural areas in the urban environment.

To the question: "How did the participants see the fieldtrip?" the following comments summed up the role that the fieldtrip played in the project:

> ...the people were serious. We did not have to break social barriers as we knew each other...the trip came at the right time...we all knew what we were there for...we requested the trip...IT WAS OUR TRIP.

One of the participants was surprised, even a little taken aback, with me being surprised by the participants commitment. As far as he was concerned he had not expected anything less as it had been our fieldtrip.

The participants voiced that this fieldtrip had been completely different to prior fieldtrips they had attended in that:

> Previously we attended fieldtrips that were presented by one or two people, on OUR fieldtrip all the participants were presenters...a real collaborative effort...all of us were experts.

and

> Previously we were involved in 'show and tell' activities but now we are looking at alternative pedagogical approaches leading to interaction by everyone...everyone, teachers and pupils must be actively involved.

The ride in one bus played an important role in building a feeling of togetherness as was evident throughout the fieldtrip. There was never a quiet moment on the bus as we moved from one site to another as participants engaged in discussion outside of me trying to get an evaluation session in.

After some debate we decided that the agenda for the next workshop (looking at the constraints for implementation) would be:

- start with an evaluation of the fieldtrip;
- not for me to give an introductory talk but to let the participants go straight into discussions to first construct their own meaning and then I could place it within the literature afterwards;
- not break into small groups but stay in a plenary sessions and see if people had grown to relate to each other in a big group; and,
- end the workshop with a discussion of the agenda for the next workshop.

This was the first time that there had been some collaboration on the actual agenda of the next workshop and, despite the fact that only four of us were involved, it was a start. This evaluation session came to an end with the arrival of the lift that we were waiting for.

4.11 **Constraints Workshop**

This workshop was to take place on the 27th of May at Garlandale High School at 15h00. On that afternoon there was a big SADTU rally discussing teacher action in the light of the educational crisis. The twelve participants present articulated the following reasons for deciding to postpone the workshop:

- we felt that the rest of our colleagues would think we were insensitive to the educational crisis if we had our workshop today when there was such an important rally taking place; and,
- we thought that we should not have the workshop on any schoolground as the police might consider our presence after school hours as suspicious.

In the light of the above we postponed the workshop to the 3rd of June, the venue being the Wagiet's residence.

The reconvened workshop was also attended by 12 participants, all biology teachers. This workshop took place during the June examinations and most of the teachers were at their busiest with preparing examination question papers and marking of examination scripts. The participants arrived quite late and the workshop only started at 16h00. The workshop followed the agenda decided by the four participants in the evaluation session after the fieldtrip (see 4.10.15).

We started with an evaluation of the fieldtrip and addressed the whole notion of collaboration as we covered most of the other possible questions in the four other evaluation sessions on the fieldtrip. On the fieldtrip we had participants working together and some working alone. We first discussed the problems of collaboration involving teachers working together from different schools to prepare the various presentations. In this regard, the biggest problem experienced by the participants was finding time to get together at the site to plan the presentation. This was the case with the presentation of the industrial area where Regan and Vincent could not find time to meet, which resulted in Regan preparing the presentation alone. All the other groups eventually were able to get together at their various sites and plan their presentations. In addition, every participant was fully in favour of collaboration since it provided not only a sounding board for idea but also shared workloads.

After the evaluation session, as a plenary, we brainstormed the constraints that could impede our implementation of this project at our schools. This, however, proved to be the poorest session in the whole project as far as participation was concerned. The participants were very tired and their minds seemed to be somewhere else, and no new ideas were generated other than those given during the interviews for the barriers to do fieldwork (see 4.2.1).

In the last part of the workshop we planned the next workshop. We collectively decided the date, time, venue and agenda for the next workshop - the first time that this had happened in the whole project. It had taken us till the penultimate workshop to get this collaborative and negotiated aspect right. It was decided that the next workshop would take place on the 10th of June at 13h30 at Garlandale High School. We decided to start earlier as it was examination times and schools closed earlier. It was also felt that we could move back to a school venue for the next workshop.

4.12 **Resource workshop**

The workshop took place as planned. It was attended by eighteen participants (2 geography and 16 biology teachers) representing thirteen institutions. The workshop started at 13h30 with a short synopsis (which I presented) of what we had done so far to help to recapture the process for all of us, as this project had already stretched over four months (see appendix 13).

We then divided into five interest groups to discuss a format of a resource for a specific site in the urban environment. The five specific urban sites were: the school grounds, informal settlements, parks and other open spaces, dunes and rivers and wetlands. We all had our outline of our resource on a

transparency and this formed the basis of the report-back sessions[18].

The last part of the workshop was devoted to discussing where we should go from this point. All of us felt that we should continue and develop a polished resource that would be available to all teachers and not only the teachers in this group. However, our biggest problem was when to do this, succinctly articulated in this observation:

> ...time is going to be our biggest constraint as the teaching pressure is going to increase as the third term is the final term for the standard ten pupils to prepare for their external examination.

In this light it was then decided that each group should set their own agendas for taking their project further. The participants all agreed to give me of their time in the new term to evaluate the project as a whole. This evaluation would then constitute the final activity for this research study. With this, the workshop came to an end.

4.13 **Pilot final evaluation session**

At this stage of the project, I decided the final evaluation would be in the form of a semi-structured interview for which I developed a schedule that I piloted with one of my 'critical friends'. The schedule consisted of four parts: the workshops, the time issue, the literature that had accompanied the notices and the issue of personal growth (see appendix 7).

After we had gone through the whole interview, my 'critical friend' highlighted the following problems and made certain suggestions:

- the biggest problem is factual accuracy due to the time lapse between the interview and the workshops. Send the

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[18] For more detail of the report-backs see appendices 14.1 to 14.5.

participants a copy of the talk you gave: 'What did we do so far' (see appendix 13) to jog their memories.

- the language of some of the questions must be simplified and elaborate where possible e.g. questions 1.6.2 (see appendix 7).
- as the interview proceeded, he remembered things that he would have loved to say in the answers to previous questions. To overcome this problem of forgotten insights, he suggested that I tell the participants to jot down ideas as the interview progressed, which they could add to the answers at the end.
- he said that to make the participants feel at ease in the interview I should tell them that there were no right or wrong answers, and all I wanted was their opinions of the process that we had undergone.
- he also said I should explain the role of the evaluation in the project before the interview.

All these recommendations were incorporated into the revised schedule of the semi-structured interview.

Regarding the remainder of the questions in the schedule for the semi-structured interview, he felt these

> would give [me] an idea how the project had progressed...how, and if, any participants had undergone changes and of what value the project had been to the participants

and said that all of them should be retained in the schedule.

4.14 **Discussion with John Fien**

I met John Fien, an Australian environmental educator in Cape Town in August 1993. We discussed the project and he introduced me to the method of Focus Group Evaluation. This method, he suggested, would lead to collective meaning making since it is not an individualistic activity like an interview. His views reinforced the vague qualms I had had about ending this research

project with one-to-one semi-structured interviews. It seemed to me that a conclusion to the research of this nature would contradict the very position I was attempting to vindicate. However, in order to gain greater clarity around the efficacy of Focus Group Evaluation for my purpose, I delved into the literature. McTaggart and Singh (1988: 421) crystallised my thoughts around this issue with their observation that

> [C]ritical reflection involves more than knowledge of one's values and understanding of one's practice. It involves a dialectical criticism of one's own values in a social and historical context in which the values of others are also crucial. Criticism itself is therefore a relational concept; criticism can only be conducted in a community where there is a determination to learn rationally from each other.

Their perception left me in no doubt that in order to gain the kind of insight into the process of emancipatory action research that I was seeking, I had to employ Focus Group Evaluation as the last moment of this cycle of the research.

4.15 **Focus Group Evaluation of the project as a whole**

The participants were send a notice with copies of the Core democratic values, 'What did we do so far' handout and the Schedule of the semi-structured evaluation interview that will form the basis of the focus group evaluation. I felt that it was important for the participants to think about these questions before the time especially of the long time lapse since when we did the workshops.

The Focus group evaluation took place on the 4th of September at the Wagiet's residence at 9h00. Although all the participants received notices only six attended, including myself. For this evaluation session I did not telephonically remind the participants two days before the time and this could possible be one of the reasons for the low attendance. The small attendance was a blessing in disguise as the theory on focus group sessions

that I was reading all spoke of focus groups must be small not more than 8 individuals to be successful.

The evaluation session started, as suggested by my critical friend, by me explaining the role of this evaluation session in the project, the outline of the interview schedule and setting the tone for the rest of the session:

> please feel free to criticize ... if it is going to be worth to anybody else it is going to depend on how honest we are with each other today... you must not see this as a nice little session where we are slapping each other on the backs....If anything, it must be the most rigorous session we have interacted in.

We then negotiated the procedure for the session. We decided that we will discuss the four areas of the schedule but not follow the questions to the book.

On the topic of the workshops, we first had a general discussion that raised many issues and did not follow the questions as in the schedule. On reflecting, this was good as participants started talking about that which they felt confidant and comfortable. This broke the ice for the rest of the evaluation session.

We first discussed the workshop that we thought was the most beneficial. We all agreed that the workshop that had the greatest impact on us was the 'education workshop'. A participant felt that the one at Westridge High School was very good and was totally different to the repeat 'education workshop' held at Belgravia High School. She attended both. We then unpacked why the 'education workshop' at Westridge High School was so good. The following reasons were forwarded for this situation:

- the size of the group (nine participants) that gave rise to greater participation not only in the group discussions but also in the plenary session.
- the group dynamics at the workshop was of such a nature that it resulted in a greater openness amongst the

participants. What brought about this group dynamics, we can only speculate and we do not believe it resulted solely because of the size of the group but we do believe it played a role.

- the topic under discussion was education 'which is our lives as teachers'. We were discussing our day to day activities although more philosophically.
- the topic also lend itself to self reflection for us as teachers.
- the workshop ended with an in-depth evaluation session.

Why was the repeat workshop at Belgravia High School so different? The size of the group (ten participants) were more or less the same as the one held at Westridge High School. Part of the reason is that one of the groups did not understand the question posed for them to discuss and report back on (see 4.8). This raised the question, Is one workshop enough for such an important topic? The answer is definitely no and it was naive of us if we thought so. We also realized that the workshops were not an end in itself as we were raising more issues than solving issues.

A problem area in the structure of the workshops was that we never critiqued the reports-backs in any depth. The biggest problem that prevented this was the time constraints. Often the report-back sessions were past the time allocated for the workshop:

> I think the time factor played a role here...there were times I wanted to ask something...but it was past five and if I asked a question then we would never have gone home as it will lead to further debate.

Secondly, after a long day at school, this was not the best time (at the end of the workshop) to be critical. Something that we must not forget is that this type of interaction was new for most of us and we need to develop our critical ability and debating skills. However, it was felt that we did reach a certain level of critical discourse in the small group discussions. Possible

solutions to these problems are discussed when we look at the time issue in this evaluation. The only workshop where there was critique of the report-backs was at the 'education workshop' at Belgravia High School due to the conflict that erose as a result of the different understanding of the question posed for discussion by the two groups. It seems that a degree of conflict definitely raises the level of the discourse.

On attempting to gain an overview of the study as a whole, certain participants indicated that the project had clarified their views: "I would not say that it changed my views ... but for me it perhaps clarified things". For others, it had changed their views completely: "My concept of a resource was totally changed in that workshop" and "...before the workshops...I never thought that I could be involved in curriculum development...it is something somebody else does...you just apply it." In one case it led to the person changing his view about his teaching: "I always believed that I was a 'good' teacher...after the education workshop I realised that during my teaching I was reproducing the society out there that I was criticizing".

This led to a discussion on the problems that accompany change in schools:

> If you try and change your way of teaching, you are going against the grain. Often you are an island at school trying alternative ways of teaching as most teachers teach in the transmission mode. This can cause conflict between you and the pupils as they are not accustomed to this way of teaching and between you and your colleagues as they might feel threatened by your alternative approaches. For some, the sound emanating from your class due to interactive teaching approach can be misconstrued as not having discipline.

One of the possible solutions suggested for change at school was 'whole school development' (Abrahams 1995). We did not have the time to delve into the topic of 'whole school development' in this evaluation but we all felt it is a topic that we should

discuss at a later stage. Some of the schools of the participants had started to engage with this concept.

he focus of the discussions now turned to the presentations I had given before the workshops. Some participants felt "that they were necessary...they gave the workshop a focus...they also raised the level of the debate." Another participant said "...those talks put me at ease...they gave me more focus." Excluding Razeena and Chris's presentation at the workshop at Groenvlei High School, I had given all the presentations, and I wanted to ascertain how participatory the participants regarded my monopoly, especially since I had not created the opportunity for other persons to present a topic at a workshop. The general perception was:

> everybody is to some extent not at the same level on the topics and I cannot get up there and talk about curriculum development...I do not have the theoretical background...so being both the facilitator and a participant...I think the onus was on you to same extent.

However, I still feel that I erred by not creating the opportunity for others to grow by presenting one of the topics.

We then reviewed the participants feelings about coming to workshops, which opened a can of worms. Firstly, it was a sad reflection on the Initial Teacher Education that we had all received as we were all fairly ignorant on a number of educational topics that we thought were important. Most of these topics had not been part of these courses and need to be incorporated into Initial Teacher Education. Secondly, it highlighted that we did not like to feel that we were not in control; we had to know everything in the classroom otherwise we felt that we had lost control. However, it was felt that we needed to realize that we had to become co-learners with our pupils and not feel threatened by the unknown.

Another important issue to emerge from this discussion was an alternative order to the workshop that, theoretically, is more sound. It was felt that we should first allow the participants

to construct their reality about the topic for the workshop. The presentation to follow should then locate these views in the literature. This could then lead to a discussion where we reflected on our views in the light of the presentation.

We now turned our attention to the workshop that had not met our expectations. There was consensus amongst the participants that this had been the 'constraints' workshop. Since it had involved our day-to-day activities, one would have thought that this workshop would go on forever. However, that had not happened. The possible reasons for this were:

- the participants were very tired as that workshop had started the latest (16h00).
- the education crisis was at its peak and the teachers were under a lot of stress.
- it was the time of the controversial June examination, and some schools were writing while others were not.
- this was the first time that we did not break into small group discussions.
- the participants did not feel comfortable to 'bare their souls' in the plenary session in addressing the question, "Which are the constraints within myself that can impede the implementation of the project at my school".

We realised that we should have broken up into smaller groups as this is central to increasing participation in a workshop. The second area that could have improved the situation is the time factor. It is impossible to engage critically after a long day of teaching and coming tired to a workshop. We therefore needed to look for an appropriate time to do this type of project to maximise its potential. Many of us felt that the best time would be during school hours so that we could be fresh to engage critically and have the time to do it.

This point raised an important related issue. What had been absent throughout this project was participant observation (Cantrell 1993). We felt that we needed to sit in each others'

classes so that we could reflect together on our practice and not as individuals. We needed to collaborate in reflecting on our practice if we wanted to make this a rigorous, critical process to improve our practice. We argued that if we are going to teach in alternative ways we needed to move away from this content-driven curriculum that is examination orientated towards a process-driven curriculum that promotes continuous evaluation. However, we noted that these ideas were all nice but we had to create a permanent structure so that we could continue to interact and try and implement these ideas. All of us felt if that did not happen all our ideas would come to nought. We needed an enabling infrastructure that creates the environment for us to put into practice these ideas that we had engaged with in this project. The formation of a permanent structure was also mooted when we discussed the issue of collaboration. It was argued that "the basis has been set in this project for collaboration...we know each other and what each others' interest areas are."
In promoting further collaboration within a more permanent structure it was said: "...we must not see it as a point of arrival but see it as only the starting point of a long journey together."

All the notices (i.e. for the workshops, the sensing of the urban environment fieldtrip and for this focus group evaluation) were accompanied by literature. My reasons for sending the literature was to give background reading to the workshops, to find out how the participants felt about the literature I sent them and if they had read it. I accept that I had unilaterally decided which articles to send the participants. However, I did not regard myself as controlling what the participants were reading during this project as I did not see these readings as the only readings but only as introductory readings. Most participants did not have time to read the articles and either only scanned them or did not read them at all. This was mainly due to their workloads, which included administrative and extra-mural duties. To the question: "Should we read literature about our practice?" all the participants agreed that we must engage in the literature if we

want to grow intellectually. Looking at the situation, did this mean we are never going to have time to read articles about our practice? Most participants indicated that they would read an article if it was the focus of the discussion. In the project we had never discussed an article per se, since it was only background reading. To address this problem, we felt we needed to start a reading-group as part of a formal structure. This would also possibly address the lack of an ethos of reading about our practice amongst the teachers.

The evaluation ended with all the participants agreeing that we needed to formalise the group. We argued that if we were to implement anything we could not wait on the Education Department but had to take our future into our own hands and become pro-active, summed up in these comments:

> ...we should see ourselves playing a role in the future...in the new South Africa.
>
> Teachers must get involved in curriculum development...we need to have input into the curriculum and other people cannot decide for us without our involvement in the new South Africa.
>
> ...we can tackle joint ventures as we have a firm foundation to look at curriculum issues.

One of the ways to realise real change for us as teachers, we felt, is to start officially sanctioned pilot studies on curricular issues as was the case with Pinelands High School. Pinelands High is one of the schools that falls under the jurisdiction of the ex House of Assembly. They scrapped geography, biology, chemistry and physics as separate subjects in standard six and seven and developed one subject, environmental science. They were given official permission by their education department for their project. To be able to do official pilot studies, we need to formalise ourselves into a permanent structure to give us a voice with the education department in the future.

On this positive note, the need to live on as a group constructing the future, the focus group evaluation session came to an end.

CHAPTER FIVE

REFLECTING ON THE PROCESS

> *The goal is not simply to report "what is out there," but to analyze this reality in ways that empower human beings to work against social, economic, cultural, and psychological constraints and ideologies (e.g. class, gender, race) that keep them from creating a more just and caring reality* (Goodman, 1992:122).

5.1 Introduction

This chapter takes the form of a critical reflection on the process of this research project from my position as a reflective teacher. Gilbert (1994: 516-7) succinctly articulates the concept of a reflective teacher to which I subscribe. She says, reflective teachers

> ...involve themselves in uncovering the many tensions and conflicts that exist between particular teaching practices, their personal theories about teaching, their values and ethical frameworks, and wider cultural and social contexts within which teaching is embedded, and in an active critique of how they came to hold these theories about teaching in the first place.

In reflecting on our practices we, as teachers, not only learn more about the educational world that surrounds us; we also gain new insights into the private world within us, "the world of our constructed consciousness" (Reinharz, 1982: 166-7). This latter aspect is central to empowering teachers to become aware of and interrogate what motivates both their practices and the attitudes which drive these. Reflection for me, then, is not only about improving the technical aspects of teaching; more pivotally, it is about assessing the extent to which teachers' practice

contributes to the development of greater equity and social justice, fundamental at this stage of our country's history as we more into a new democracy.

Within this framework, the current reflection on this research process attempts to shed light on the central research question of this study, namely:

- **Can emancipatory action research play a role in empowering teachers to become transformative intellectuals?** (see section 1.3)

The theoretical basis for this reflection comprises Robottom's (1987) guiding principles for professional development in environmental education (see section 3.3) and Sprague's (1992) language of critique and language of possibilities for teacher empowerment (see sections 3.4.2.1 and 3.4.2.2). Consequently, this chapter focuses on four related issues:

- the guiding principles of professional development in environmental education (section 5.2);
- the language of critique: understanding the powerlessness of teachers (section 5.3);
- the language of possibility: paths to empowerment (section 5.4); and,
- reflecting on the research objective (section 5.5).

The last section of this chapter, *The Road Ahead, Teachers constructing their future* (section 5.6) discusses the implications of the knowledge that emerged from this study for future collaborative action.

5.2 The guiding principles of professional development in environmental education

Robottom (1987) contends that programmes of professional development in environmental education should be participatory and practised-based, inquiry-based, critical, community-based and collaborative (see section 3.3). I will now visit each of these

guiding principles to establish to what extent, if at all, we were able to 'live' them in our research process.

5.2.1 The principle of participation and practise-base

McTaggert (1991: 171) clarifies the concept of participation for me when he differentiates between involvement and participation:

> [A]uthentic participation in research means sharing in the way research is conceptualised, practised and brought to bear on the life-world. It means ownership - responsible agency in the production of knowledge and the improvement of practice. Mere involvement implies none of this; and creates the risk of co-option and exploitation of people in the realisation of the plans of others.

There was no participation in the conceptualisation of the research as I had been solely responsible for this aspect of the research process. The conceptualisation of the research project took place at Rhodes University (away from the participants) while I was busy preparing my research proposal for the Education faculty. Although, in the interviews all the participants saw the benefit and the need of the project (using the urban environment in the teaching of ecology; see section 4.2), I was basically seeking their approval for something that I had, individualistically, conceived.

This situation, the non-participation of the conceptualisation of the project, was addressed when the Biology and General Science Teachers Forum, an offshoot of this study, was formed in 1994 (see section 2.4.2). All the participants were involved in the conceptualisation of the role of the forum. We decided that the focus of the forum would be to make the biology and general science curricula relevant to the needs of our learners in the challenges they face in the reconstruction of a post-apartheid South Africa. This resulted in the implementation of relevant curricula in 1995 that we had collaboratively developed (see appendices 15.1-15.3). I see this development as the second spiral of action research which developed out of this primary

research and the research undertaken by one of the participants (Reddy 1994). This project could lead to the start in 1996 of the development of officially sanctioned pilot studies on curriculum development by teachers in various schools to inform the national debate on the introduction of new biology and general science curricula in two years time (see section 5.5). Once practitioners start to research their own practice, the research process never ends.

If this principle of participation, in which all the participants are involved in the conceptualisation of a research project, is to be adhered to, university authorities will have to allow action researchers to conceptualise the research project with potential participants before presenting their research proposals. This has certain important ramifications in the domain of tertiary education, with its current underlying technicist and rationalist exclusivity which, unfortunately, lie beyond the scope of this study.

I also did not create the opportunity for the participants, except Razeena and Chris on one occasion, to present any of the topics at the start of the workshop (see sections 4.7 and 4.15 for the discussions on this topic). Disregarding this state of affairs in the workshops, during the 'sensing of the urban environment' fieldtrip all the participants were involved in presenting at the various sites (see subsections of 4.10). At that stage the participants felt relaxed in each others' company, and there was enough trust in the group for the idea of presenting to one's peers not to be a daunting task. It is important therefore that participatory action research builds into its schedule a sufficient time scale for participants to develop interpersonal trust.

Another area related to imposed time scales, in which virtually no participation occurred, except for two participants involved in face validity (see section 2.4.3), was the writing up of the thesis. This was mainly due to time constraints. However, I feel

that in future action research projects, more thought must be given to this aspect. I believe that time must be incorporated into the research schedule to address this issue.

However, there was one aspect of the research process that grew in participation as the process developed: the planning of the workshops. This growth in participation was due to the critical reflection that took place during the various evaluation sessions.

The workshops themselves also allowed all the participants to participate fully. The workshop procedure of breaking into small group discussions was very important in promoting participation by all[19]. The best example of authentic participation in this project was during the 'sensing of the urban environment' fieldtrip. The participants collaborated in every aspect of the activity, from its conceptualisation through to the planning and execution of it.

Participation in all aspects of research is possible but we need to create enabling infrastructures for teachers to feel sufficiently relaxed and confidant to become authentic participants in the process. When developing the research schedule, an important question that we must ask ourselves is: " How can we bring about participation by all, in all aspects of the research process?"

The last issue I would like to address regarding participation in action research is: "Who should participate in action research projects?" My opinion is that practitioners must research their own practice. This does not preclude the rich engagement of 'outsiders', such as university lecturers (Walker 1993). However, it does insist that such engagement occurs on our terms, the terms of the practitioners on the ground. If we allow ourselves

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[19] The only time we did not break into small groups (the fourth workshop), it resulted in the least participation in any of the workshops (see section 4.15).

to become involved in the agendas of 'outsiders', we run the risk of co-option and exploitation in the realisation of the plans of others (McTaggart 1991). We should be the driving force behind the project, research by teachers for teachers, not the reverse as has often been the case in action research projects in South Africa, with teachers being 'driven' by 'outsiders'.

As far as the practice-based principle is concerned, one of the central aims of this research was to improve our practice. We were looking at how the utilisation of the urban environment could build our capacity to teach ecology. We were not only looking at the where (sensing the urban environment fieldtrip) and the how; more importantly, we were examining why we should teach ecology in the urban environment to pupils who are urban dwellers (see sections 4.2 and 4.4). We did not see practice as a purely technical action but as a social practice (Walker 1993). With regards to the how, we did engage in looking at different ways of teaching in the final workshop when we developed a format for the different sites in the urban environment (see section 4.12 and appendices 14.1 to 14.5).

What we did not do, however, due to time constraints, was participant observation (Cantrell 1993). In a bigger project, we should include observing each others' lessons when implementing the project at our various schools to enable us to undertake collaborative reflections. Potential logistical problems with regards to this suggestion could be overcome by ensuring that more than one person from a school is involved in the project. Ideally, a whole department at the school should be involved.

5.2.2 **The principle of collaboration**

If collaboration amongst teachers is to be realised, we need to break the isolationism that is so much part of the culture of our schools (Robinson 1993). Robinson (1993) argues that we must not encourage a new kind of working together but build a

new culture of collaboration. This is exactly what we did in this project. We developed an ethos of collaboration, so aptly put by one of the participants:

> We must not see this project as a point of arrival but as a point of departure for collaborative action.

The only occasion in this project that lent itself to collaborative action, the 'sensing of the urban environment' fieldtrip, resulted in teachers from different schools collaborating in the planning and the execution of their presentations (see subsections of 4.10). One of the participants who had worked alone stated that he would have loved to work with another person to share ideas in the preparation of the presentation (see section 4.11). This project was definitely a 'point of departure' for collaborative action.

Then, the implementation of a relevant biology and general science curricula under the auspices of the Biology and General Science Teachers' Forum was the outflow of collaboration not only between teachers at the same school but also between teachers at different schools. With the possible development of official pilot studies at the beginning of 1996 (see section 5.6), we will not only have to collaborate with each other (teachers) but with the advisory services and the Director of Curriculum of the Western Cape Education Department as well. We are going to need to develop a new culture of collaboration with department officials that breaks with the old way of 'working together' with department officials in the apartheid era. This is not going to be an easy task; however, it is crucial if we want to change the structures to enable us as teachers to collaboratively construct our futures.

5.2.3 The principle of inquiry-base

The entire study was enquiry driven as we were not engaged in research "on or about education [but] research in and for education" (Kemmis 1984: 79). We were not engaged in an interpretive study; our research took the shape of a critical reflection of our practices, with the objective of transforming these.

For example, participants problematised the project by asking in the semi-structured interviews (see section 4.2): "What does the urban environment has to offer for the teaching of ecology?" The participants did not only want to know where we could do what but also why we should do what, where (see sections 4.2 and 4.4). The whole research project was geared to answering this question as it culminated in the sensing of the urban environment fieldtrip (see subsections of 4.19) and the development of a format of a resource to be used at the various sites in the urban environment in the last workshop (4.12). Throughout this project, we had a research stance, researching our practice in the process of exploring the question that we set for ourselves.

5.2.4 The principle of community-base

In 1988, one quarter of the total urban population in South Africa lived in informal settlements[20] (Wynberg 1993), where the most serious urban environmental problems are found: over-population, urban water supplies, sewage and solid waste management and urban pollution and environmental health problems (Lawson 1991). As a consequence of this study, in 1994, a standard eight class at Belgravia High school was involved in a project researching the Vygieskraal informal settlement. This was their community outreach project for the

[20] One of the biggest problems facing not only the people living in the cities but the country as a whole is informal settlements.

year, and is an example of how this action research project not only led to a participant getting involved in a real community problem but his pupils becoming involved as well.

However, a distinct critique that can be levelled at the research project is: "Why did we only engage in one socio-political urban environment problem?" (see section 4.15). Most of the participants looked for natural environments in the urban environment to work in for the sensing of the urban environment fieldtrip (see subsections of 4.10). A possible reason for this is that our 'training' as biology teachers had been in the natural environment and we felt very uncomfortable working in the socio-political environment as that was not the norm for us (see section 4.8). On the other hand, the geography teachers were more attuned to working in the socio-political environment. This state of affairs is a sad indictment of our fragmented teacher education programmes.

One of the ways of addressing this problem is to unpack the concept of the environment and make this a component of community-problem solving projects as part of initial teacher education and continuous teacher education. This is crucial since teachers must be made aware of the fact that the environment comprises more than just the bio-physical; the sociopolitical, cultural and economic aspects have to be brought into the equation as well. In short, we need to make the pedagogical more political and the political more pedagogical (see section 3.5).

5.2.5 **The principle of being critical**

In the 'educational' workshop (see sections 4.6, 4.8 and 4.9) we *did* engaged in an ideological critique of the educational values and assumptions that inform our educational practice. However, we realised that one workshop was insufficient to unpack the effects that fundamental pedagogics has had on our ways of thinking and doing as teachers. Nonetheless,

throughout this research project, we did not remain on the technical level of merely attempting to enhance our already-acquired teaching skills; rather, we viewed our practices as part of a process of developing critical, active citizens. This is borne out by the fact that certain participants' formats of a resource (see section 4.12) took the form of a process involving the active participation of the pupils (see appendices 14.1 to 14.5).

The central focus in the Biology and General Science Teachers' Forum took the shape of an ideological critique of the education system, which then formed the basis of our development and implementation of a curricula that we thought more relevant to the needs of the community. In this process we made the appropriate changes that allowed us to achieve the educational objectives that we preferred. The underlying potential problem, however, is whether we sustain this situation (see section 5.5).

I am the first to admit that there is still a long journey ahead for us to become ideologically critical teachers as it will not be easy to shrug off our cultural capital that has been part of our being for so many years. For many of us, the biggest problem will be the self-confrontation required to change not only our practices but also our inner motivations which drive these.

5.3 The language of critique: understanding the powerlessness of teachers

Sprague (1992) identified the following factors as playing a role in the disempowerment of teachers:

- the feminisation,
- the technologising,
- the deskilling,
- the intensification,
- and the privatisation of the teachers' work.

The feminisation of the teaching profession and the intensification of the teachers' work are factors of teacher disempowerment that we could not address in this research project. These two factors will have to be addressed at the highest level as they involve 'structural' changes in the education system that can only be addressed at national level. This does not mean that we as teachers should sit back and do nothing about it. We need to put pressure on the education department to address these two factors via the various teacher organisations.

Some teachers have tried to decrease their administrative workload by working together, sharing practical work and writing common examinations. However, we need to ask ourselves whether, in doing this, are we not merely learning to adapt to conditions that we need to change in the first place? In other words, we are not challenging the status quo but learning to live with it thereby, ironically, maintaining our disempowerment. Davidoff (1993: 76) concurs with Walker (1990) in arguing that:

> ...we might well be validating apartheid education by enabling teachers to cope better with less, to become more resourceful, and in so doing, to demand less and perhaps even feel the need for less.

We do need to improve our technical teaching skills but we should achieve this as part of a broader emancipatory vision of education and not as a end in itself.

The technologising, the deskilling and the privatisation of teachers' work are factors that we could address as they fell within the possibilities of the reality of this research project. In trying to overcome these three factors of disempowerment we heeded the words of Kemmis (1984: 80-81) that:

> critical educational science requires *participants to collaborate* in the organisation of their own enlightenment, the decision-making by which they will transform their situations, and continuing critical analysis in the light of consequences of those transformations which can sustain the engagement of scientific discourse, processes of enlightenment and practical action. (My emphasis)

In the course of this project we moved away from being technicians implementing the prescriptions of the educational department and engaged in intellectual labour (Giroux 1985) in developing a curriculum for teaching ecology in the urban environment. In this collaborative venture we started to break down the privatisation of the teacher in order to develop the skills that would allow us to become actors in our own history. In this process, we broke the separation of the design of the curriculum from its execution. Theory and practice merged into praxis, the practitioners developing their own curriculum.

In the first three workshops (see sections 4.3, 4.4, 4.5, 4.8 and 4.9) we developed the theoretical framework to engage in curriculum development. We were not only interested in the 'how' but, more importantly, why we should be undertaking this task (see section 4.8). This orientation ensured that whatever we were doing was part of a transformative vision as we knew whose interest we should be serving and why. In this process we became the living embodiment of Stenhouse's (1975) view: teachers as researchers, researching our own practice with the aim of transforming it. We were not trying to transform our practice in isolation of society but with the aim of developing a socially-just and ecologically-sustainable society.

This project also laid the foundation for further collaboration, outlined by one of the participants as follows (see section 4.15): "...the basis has been set in this project for collaboration, we know each other...!

This project led to teachers from different schools as part of the Biology and General Science Teachers' Forum collaborating in the development and implementation of new curricula in 1995. During 1995, the teachers met on numerous occasions to address the problems inherent in introducing a new curriculum without official sanctioning (see appendix 16).

More or less at the same time when this was taking place, the forty one subject committees of the Department of National Education were involved in developing the interim curricula for implementation in 1995. On these committees were teachers from various teacher organisations. However, their participation on these committees should not be construed as teachers collaborating in the development of a curriculum. These teachers merely became part of the 'expert' committee that developed a curriculum that the teachers then, as technicians, had to implement. The teachers on these committees did not engage with their fellow teachers (whom they were representing) on a regular basis during the development of the interim curriculum. Their contributions were not an outflow of collective meaning making by teachers but their personal views.

This situation resulted in the interim curricula for biology (standard 8,9 and 10) and general science (standard 6 and 7) basically being a replica of the curricula of the ex-House of Assembly schools. The biggest change for the rest of the schools was in the standard seven general science curriculum. This resulted in the 'haves' of the past having the necessary resources (textbooks) when the interim curriculum was introduced in 1995. The Western Cape Education Department Biology subject committee, of which I am a member, developed 'notes' on the new section of the standard seven general science curriculum which was to go to all the schools, except those which had originally fallen under the auspices of the ex-House of Assembly in the Western Cape. In February of 1996, these 'notes' had not yet arrive at our schools due to a lack

of finances. So the 'have-nots' of the past are still the 'have-nots' of the new South Africa. It is my opinion that the interim curriculum for biology and general science was 'hijacked' resulting in the House of Assembly's curricula being presented as the interim curricula[21].

This is not 'real' change in my view but a cosmetic change in teacher participation in curriculum development. If we want to realise real change in teachers participating in curriculum development, we will have to critically look at the existing structures and transform these in ways that will allow a democratic process of curriculum development.

The biggest constraint to collaboration amongst teachers identified by this study is time (see section 4.15). We need time during school hours to collaborate properly on ventures that we as teachers have conceptualised (See section 4.15). If teacher collaboration is to lead to empowerment, we are going to need an enabling infrastructure at schools; the alternative is that teacher collaboration will degenerate into mere tokenism (see section 3.4.4.2).

That teacher empowerment is within the realms of practical possibility was vindicated by this study. For its duration, we changed the privatisation, technologising and deskilling of ourselves by collaborating in an ideological critique of education that has led to collaborative action.

5.4 **The language of possibility: Paths to empowerment**

Sprague (1992) identified four paths to empowerment:

- empowerment through resistance,
- empowerment through collaboration,

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[21] The views and opinions in this paragraph are on record in the minutes of the Western Cape Education Department Biology Committee as I aired these opinions in one of our meetings in 1995.

- empowerment through shared leadership,
- and empowerment through a transformative vision (see subsections of 3.4.4).

In this project we followed the pathway of empowerment through collaboration driven by a transformative vision. The other two paths were not appropriate for this project and were not engaged.

I do not see these two pathways, empowerment through collaboration and transformative vision, as mutually exclusive; rather, they are the two sides of the same coin. Collaboration with a transformative vision is the only way I believe we can collaborate if we want to realise real change. Collaboration without a transformative vision would degenerate into engaging in the technical aspects of teaching, leading only to the improvement of teachers as technicians.

The first three workshops played an important role on our path of collaborating with a transformative vision. In these workshops we engaged with various areas of educational theory with the aim of improving our understanding of our practice. We were not putting theory into practice at this stage of the process but putting theory into practitioners (Jackson 1986). This process was a form of conscientisation as described by Freire (1970:27):

> ... the process in which people, not as recipients, but as knowing subjects, achieve a deepening awareness both of the socio-historical reality which shapes their lives and of their capacity to transform that reality.

We were developing a critical consciousness that Sprague (1992) argues is important if transformation is to become a reality. During this process not only did we undergo a consciousness-raising experience but the theory and practice also became one in action during the sensing of the urban environment fieldtrip (see subsections of 4.10) and the

development of a format of a resource (see section 4.12). As this research process unfolded we, as teacher researchers (see section 3.6) were engaging in intellectual labour as 'infant' transformative intellectuals (see section 3.5) rising to Lather's (1991: 163) challenge that "intellectuals with liberatory intentions" should transform their own practice.

Engaging with educational theory was not easy for us (see sections 4.8 and 4.15). A possible reason for the differences in outcome between the educational workshops at Westridge High School and Belgravia High School (see sections 4.6, 4.7 and 4.8) can be read in the reminder of Fullan and Hargreaves (1992:36) that:

> Teachers are people too. You cannot understand the teacher or teaching without understanding the person the teacher is too ... And you cannot change the teacher in fundamental ways, without changing the person the teacher is, either ... Teachers become the teachers they are not just out of habit. Teaching is bound up with their lives, their biographies, with the kind of people they have become.

We need to realise that we are involved with different personalities and that every participant brings their unique cultural capital into the research project. In trying to address this issue, a different workshop procedure to include these differences in our discourse, thereby easing us into coming to grips with educational theory, was suggested in the final focus group evaluation (see section 4.15). The procedure suggested was:

- first break into small group discussions to construct our understanding of the topic under discussion.
- have the groups reporting back in a plenary session.
- now we have a presentation placing our constructions within the current literature on the topic. This we realised would not be an easy task, and is possibly where an outside academic could play a role.

- the last part should be a reflection session in which we reconstruct our understanding in the light of the presentation.

This more deductive procedure is a distinct departure from the inductive approach in the workshops during the research project, where we first had a presentation followed by small group discussions in our workshops (see section 2.3.3). This suggested procedure for a workshop allows us to confront the issue of false consciousness. Furthermore, it facilitates the construction of our understanding and allows, after the presentation (in the reflection session), for potential deconstruction of this understanding, with the aim of highlighting the false consciousness in our understanding. This, in turn, could lead to the reconstruction of our understanding of the topic under discussion. This workshop procedure is an improvement on our earlier 'model' in that it holds greater potential for us to rethink our roles as teachers in society.

5.5 **Reflecting on the research objectives**

In addition to the central research question (see sections 1.3 and 5.1), this research project has three specific research objectives (see section 1.3):

i. to discover whether teachers feel the need for professional development processes, using the method of emancipatory action research, such as provided by this project;
ii. to identify the barriers this research project had to overcome;
iii. to assess our achievement during this research process.

Regarding the first objective: *Whether teachers see the need for professional development processes, using the method of emancipatory action research, like that provided by this study*, the answer is a definite "yes". As early as the third workshop at Westridge High School (see section 4.7) and again in the focus group evaluation (see section 4.15) there was a call for the group to form a permanent structure so that we could continue with what we were doing. This call was the stimulus for the formation of the Biology and General Science Teachers' Forum in 1994. Of the eighteen participants who had attended the last workshop at Garlandale High School (see section 4.12), ten are currently active members of the Biology and General Science Teachers' Forum. The reasons for the other eight participants not being involved in the Biology and General Science Teachers' Forum are:

- one participant was retrenched at the end of 1993;
- two are geography teachers and one is a lecturer at a College of Education and they had no interest in developing and implementing a relevant general science and biology curricula;
- three participants already belong to a similar organisation (i.e. the Mitchells Plain Biology Forum);
- one participant had to teach mathematics instead of biology in 1994 and 1995.

The second objective: *What were the barriers that this research project had to overcome?* identified those of a conceptual and logistical nature. In this research project, while we did not have educational or attitudinal barriers to overcome (Ham and Sewing 1987-1988), the conceptual barrier that we had to discover the means to overcome was our understanding of various areas of educational theory (see sections 4.8 and 4.15). As a result, during the focus group evaluation (see section 4.15) we came up with an alternative procedure for the workshops that we felt would facilitate our understanding of educational theory. What this procedural shift from an inductive to a deductive approach, which we had

negotiated, made apparent to us on a micro scale (i.e. this project), is needed on a macro scale (school level) with the educational structures being so altered as to sustain real change.

The biggest logistical barrier that emerged during this research was time. We held our workshops after school hours, with most of them ending at 17h30, the earliest. The main reason we ran out of time in the workshops was because of an over-loaded agenda. We were trying to cover too many topics in one workshop. We learned that one topic is all we could cover in one workshop after school hours. This eventually took place in the fourth (see section 4.11) and final workshop (see section 4.12).

Due to the time constraints we could not:

- critique the report-backs of the various groups in any depth;
- end the workshops with an in-depth evaluation session, except for the workshop at Westridge High School (see section 4.6); and,
- plan the next workshop with all the participants present (this only happened once in the fourth workshop at the Wagiet's residence - see section 4.4.11).

We believe that the best time for teacher workshops is during school hours (see section 4.15). We (myself and one of my 'critical friends') broached the topic of time for professional development of biology teachers with the Western Cape Education Department's Biology subject committee. We put forward the suggestion of one professional development afternoon per term as a start. We suggested that the pupils be sent home early on those days, and the teachers would report to their various subject venues. This suggestion was forwarded to the Western Cape Education Department Central Curriculum Committee and we are still awaiting a reply. However, there are encouraging signs as the biology teacher workshops under

the auspices of the Department's Advisory services in February 1996 are whole day activities, starting at 9h00 to 15h00 (see appendix 17).

What we achieved during this research project (the third research objective) was a better understanding of our practice that led to us seeing our roles as teachers and our teaching differently. We had a consciousness-raising experience (see section 5.3) during this research project. Secondly, this process developed the belief within ourselves that we, as teachers, can and should make a difference to the educational world in which we live. This led to what I believe is the biggest achievement of this research project, laying the foundation for continued collaborative action. This research project and the participatory research project of Reddy (1994) (Reddy was one of the participants of this research project) that took place in the latter half of 1993, led to the formation of the Biology and General Science Teachers' Forum in 1994. Another outflow of this project could be the possible development and implementation of officially sanctioned pilot studies (see section 5.6) of biology and general science curricula in 1996 and 1997.

Reflecting on the central research question: *Can emancipatory action research play a role in empowering teachers to become transformative intellectuals?* one can say that the method of emancipatory action research played a role in us, in our specific historical context, taking the first step on the long journey to becoming transformative intellectuals. This research project constitutes the first action research cycle in the action research spiral (see section 2.3.6). We took our second step on our journey to becoming transformative intellectuals when the first action research cycle gave rise to the second action research cycle in 1994 and 1995. The second action research cycle in this action research spiral are the activities of the Biology and General Science Teachers' Forum. In 1996 we could be taking our third step as

we try and develop biology and general science curricula possibly to be implemented in 1997 as part of an officially sanctioned pilot study. This, if it is realised, would constitute the third action research cycle in this action research spiral that was started in 1993 with this research project. This ongoing process is a result of teachers researching their own practice with a transformative vision using the method of emancipatory action research.

5.6 The Road Ahead: Teachers Constructing their Future

This research project, which examined how we could utilise the urban environment in the teaching of ecology, embodied the path suggested by Davidoff (1993: 80):

> ... given our particular situation in South Africa, it is crucial for us to start with where teachers are, and where they are is not necessary located in a tradition of innovative and reflective practice. For those of us working as facilitators or teacher educators, or teachers interested in action research, this can be the only starting point...

In this project, we looked at the topic of ecology that is part of the syllabus that must be taught and examined. The implementation of this project complements the existing curriculum on ecology and therefore does not need fundamental structural changes in the education system to be realised. In implementing this project in schools, we will not be going against the authority of the Educational Department. This I see as our first safe 'step' on our journey which I feel is a necessity if continued collaboration is to become a reality. This 'step' I feel is justified in the light of the continued collaboration of the participants.

The next 'step' in our journey, the activities of the Biology and General Science Teachers' Forum, was dramatically different from the first. It was similar in that we were collaborating with a transformative vision but different as we were following the path of resistance to empowerment (see section 3.4.4.1). We developed alternative curricula and

implemented them without official sanctioning. We were going against the grain in defying the authority of the Education Department.

During this 'step', we learned that change is not smooth. We came to understand just how difficult and painful educational transformation is. We came to realise that:

> [I]t is not only that the educational bureaucracies are against us, or that we will feel threatened and hurt by the prospect of having to reflect on what we are doing in order to change it; it is that change itself is a laborious and complicated process that is usually more likely to fail than succeed. (Van den Berg 1994: 41-42)

Furthermore, we learned Davidoff's (1993: 77-78) contention that

> [S]chools are almost always structured in top-down hierarchical manner. Besides the formalised power-relations, there are also informal power relations, which have to do with age, gender, length of time at a particular school, personal relationships with people in authority, etc. ...Creating democratic practices in school structures is rare practice indeed. In this way, our schools tend to mirror our extremely undemocratic society

the hard way. That schools in their present form are not conducive to change is further borne out by Robinson's (1993: 70) conclusion that

> [I]t seemed that educational innovation, even within an action research framework which aimed deliberately at making the innovation meaningful to the participants, was doomed to flounder in the midst of a school system which was utterly unable to support processes of collaborative reflection, action and evaluation.

In the realms of environmental education, these findings concur with Huckle's (1994) observation that structurally, schools are too rigid and inflexible to be conducive to innovations in environmental education. These structural constraints on our collaboration are reflected in the dropping off of the activities of the Biology and General Science

Teachers' Forum in the latter half of 1995 (see appendix 16), arising from apathy due to the perpetual frustration of continually having to contend with the obduracy of officialdom. If the activities of this Forum are to be sustained, we need a delicate combination of top-down political and structural innovation, and bottom-up commitment from teachers (Robinson 1994). Neither, on its own, is likely to sustain change. In the activities of the Biology and General Science Teachers' Forum we only had the one - bottom up commitment from the teachers - and therefore its activities could never be sustained. We were learning the painful lesson that the rhetoric of change is far easier than the reality, so cogently put by Walker (1993: 119):

> There is no inherent guarantee that the research will empower without shifts in the material base of power relations.

As a consequence, if we are to realise real change, we will require more than consciousness-raising experiences; fundamental structural change within the eduction system that brings about shifts in the power relations as they are at present will also have to occur.

The question that now confronts us, as teacher researchers, is: "How do we realise real change?" One option is to challenge the educational rhetoric of the *White Paper on Education and Training* (Department of Education 1995: 27):

> [T]he Ministry of Education is committed to a fully participatory process of curriculum development and trialling, in which the teaching profession, teacher educators, subject advisors and other learning practitioners play a leading role, with academic subject specialists and researchers. The process must be open and transparent, **with proposals and critique being requested from any persons or bodies with interests in the learning process and learning outcomes**. (My emphasis)

This challenge could occur in the context of developing a proposal for a curriculum development pilot study as suggested in the focus group evaluation session (see section 4.15) and to be laid in front of the Director of Curriculum of the

Western Cape Education Department for official sanctioning. The pilot study could continue the work of the Biology and General Science Teachers' Forum in using the method of emancipatory action research to develop curricula for standard six and seven general science and standards eight, nine and ten biology, which promote socially just and ecologically sustainable ways of life (see section 1.5.3) in developing critically, active citizens.

If such a proposal is accepted by the Western Cape Education Department, the development of these curricula could take place in the second half of 1996, with possible trailing in 1997. We could, as a result of these pilot studies, develop an informed document that can become part of the national education debate about the new curricula that is supposed to replace the interim curricula in 1998 in schools. An officially sanctioned pilot study would, however, have to address the power relations in schools as it will need an enabling infrastructure that has strong administrative support. There should also be a reduction of instructional demands so that the participants in this pilot study have officially sanctioned time off to collaborate in developing and trailing the new curricula. It is hoped that an officially sanctioned pilot study would bring about the necessary structural changes fundamental to realising real change.

I would like to conclude this thesis with the words of Owen van den Berg (1994: 29-30) which, for me, summarise what we need to do in the coming years if we are serious about changing our ways of thinking and doing and, concomitantly, changing the structures of the institutions in which we work

in order to practise as transformative intellectuals in South Africa:

> []The time is coming for us to stand up and be counted: ... There will be many who now want to receive the rewards of their resistance and sit back and bask in the post-apartheid glow, rather than realise that the real work can now begin, and that we are the people who are going to have to begin it...As educators, I believe we need to see the coming months and years as a time when we have to make strenuous efforts to learn and transform what we are doing and the institutions in which we work.

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APPENDIX 1

Comparative education statistics 1989

	White Education	Indian Education	Coloured Education	African Education (DET)
Pupil–teacher ratios	17:1	20:1	23:1	38:1
Under-qualified teachers (less than std .10 plus a 3-year teacher's certificate)	0 %	2 %	45 %	52 %
Per capita expenditure including capital expenditure	R3 082,00	R2 227,01	R1 359,78	R764,73
Std .10 pass rate	96,0 %	93,6 %	72,7 %	40,7 %
(Sources: DET, 1989, p. 216; Du Plessis et al., 1990; SAIRR, 1990, pp. 795, 825, 829)				

APPENDIX 2

Socially-Critical Education FOR the Environment

A Critical ENV CONSCIOUS-NESS 1	Critical Thinking and Problem-solving SKILLS 2	Environmental ETHIC 3	POLITICAL LITERACY 4
ECO-SOCIALIST BELIEFS 1 The social construction of the environment 2 Participatory nature of environment politics 3 Roots of environment crisis lies in social and economic systems 4 Need for complimentary changes in: *the economic base, and the *ideological superstructure to solve environment problems	**INQUIRY SKILLS** 1 observation and perception 2 definition and description 3 analysis and explanation 4 prediction and evaluation 5 decision-making 6 personal evaluation and judgement **IDEOLOGY CRITIQUE** identify: 1 links between self, wider social and economic systems, 2 who makes decisions, and the values and power that legitimates these decisions 3 who gains and loses from this 4 contradictions in DOMINANT SOCIAL PARADIGM 5 Opportunities for transformation	**PEOPLE-PEOPLE** Relationship for Social Justice 1 Basic human needs 2 intergeneration equity 3 Human rights 4 Participation **PEOPLE-NATURE** Relationship for Ecological Sustainability 1 Interdependence 2 Biodiversity 3 Living lightly on the Earth 4 Interspecies equity	**ENV. POLITIC** 1 Resources & production 2 Distribution & redistr. 3 Power and Decision-making 4 Social organisation 5 Culture and Ideology **VALUES OF DEMOCRACY** 1 Openness 2 Tolerance 3 Respect for alternatives 4 critical stance towards political information **ACTION SKILLS** 1 Evaluate alternatives 2 Decide on Action 3 Plan and implement 4 Evaluate act

5. CRITICAL PRAXIS

APPENDIX 3

SCHEDULE OF SEMI-STRUCTERED INTERVIEW

ECOLOGY

1 How long have you been teaching Ecology?

2. Have you done any fieldwork in Ecology?

2.1.1 If yes, briefly describe the nature of the fieldwork activities and where it took place.

2.1.2 If not, what are the possible reasons for not doing fieldwork?

3 Environmental Education has been receiving quite a lot of coverage in the media especially on the T.V. Do you think there is a relationship between Ecology and Environmental Education.

3.1 If your answer is yes or no to number 3, please elaborate.

URBAN ENVIRONMENT

4 Have you ever used the urban environment in the teaching of Ecology?

4.1 If yes, <u>where</u> and <u>how</u> did you use the urban environment.

4.1.1 Name a few habitats in the urban environment that can be used in the teaching of ecology.(excluding the ones you mentioned in 4.1)

4.2 If no, do you see the need to use the urban environment?

4.2.1 Yes or no, clarify your answer.

5 What is your opinion of the following statement :

One of the reasons why teachers will be hesitant to use the urban environment is that most literature e.g.textbooks only explain Ecology in terms of natural settings.

APPENDIX 3

6 If one could use the urban environment, do you see any benefits in doing so compared to using natural areas.

6.1 Yes or no,clarify your answer.

RESOURCE DEVELOPMENT

7 Have you used any resources when you taught Ecology?

7.1 If yes, give examples.

8 Have you been involved in a resource development program?

8.1 If yes, please elaborate.

9 Give a brief definition for the term resource.

TOPICS/ACTIVITIES OF THE WORKSHOPS

10 Are there any topics/activities which you feel must be part of the workshops.

PARTICIPATION IN PROJECT

11 Would you be prepared to be a participant in this research project.

APPENDIX 3

PERSONAL DATA

Name : .....

Surname : .....

Name of School/Institution :.....

State the subjects you teach :

STANDARD/LEVEL	SUBJECTS

How many years are you teaching ? .....

Please state your :

Academic qualifications :.....

.....

Do you have any courses in ecology :.....

If yes, give details :.....

.....

Professional qualifications : .....

.....

Do you belong to any Environmental or Ecological organisation ?

.....

If you do, name the organisation : .....

.....

Do you subscribe to any educational/academic magazines or journals? .....

If you do, name the magazines/journals :.....

.....

ALL RESPONSES WILL BE TREATED CONFIDENTIALLY.

APPENDIX 4.1

URBAN ECOLOGY PROJECT

22 March 1993

NOTICE OF MEETING

Dear .....

The first meeting of this project will take place at **15h15** on **THURSDAY, the 15th of APRIL** in the biology laboratory at Belgravia High School. Belgravia High School is in Veld road off Belgravia road in Athlone.

The proposed agenda for this meeting is as follows :

1. Welcome by facilitator of project ..... Fadli Wagiet
2. Decide on dates and venues for the workshops.
3. " What is **Action Research** ? " ..... Fadli Wagiet
4. Discussion of the **Analysis of the Interviews**.
5. Planning the agenda of the first workshop.
6. Any other matters.

Hoping that you will be able to attend the meeting,

Yours for the Environment

Fadli Wagiet.

Facilitator: Fadli Wagiet
Home tel: 349414; Work tel: 6965118

APPENDIX 4.2

URBAN ECOLOGY PROJECT

7 April 1993

READINGS FOR MEETING ON THE 15TH APRIL

Dear .....

Please find the following readings as back ground readings for our first meeting :

(i) The proposal of the research project. This will hopefully give you an idea of the thoughts that went through my mind when the proposal was developed.

(ii) The analysis of the interviews with the various teachers. This will give you the views of the other participants with regards to the questions in the interview. It will also prepare you for point 4 of the agenda of the meeting.

(iii) Readings on Curriculum Development and Action Research as preparation for the talk on Action Research which is point 3 on the agenda.

Hope you find the readings interesting and stimulating.

Yours for the Environment

Fadli Wagiet.

Facilitator: Fadli Wagiet
Home tel: 349414; Work tel: 6965118

APPENDIX 4.3

URBAN ECOLOGY PROJECT

18 April 1993

NOTICE OF WORKSHOP

Dear .....

The workshop will take place at **14h30** on **Thursday**, the **22nd** of **April** at **Groenvlei High School**. Groenvlei High is in Barend road in Groenvlei in Lansdowne. The school can be seen from Jan Smuts Drive. If you have any problems in trying to find the school, please contact Imtiaz Adams (732277-school or 6913773-home) who is the Biology teacher at Groenvlei High School. Please ask your principals if you can leave at 14h00 so that we can start promptly at 14h30. Take this opportunity to inform your principal about our project and the benefits for the school.

The proposed agenda for this workshop is as follows :

1. Welcome.....Fadli

2. Clarifying Ecology and Environmental Education.....Razeena

3. Why is the Urban Environment important?.....Fadli

4. Why do we teach Ecology?
   4.1 Aims of Education and Tibilisi Principles.
   4.2 The role of resources in Education.....Fadli

5. Evaluation of workshop and agenda for next workshop.

6. Any other matters.

The dates and venues for the other workshops has been finalised viz.

DATES	VENUES
6 May (Thur.)	Westridge High School
15 May (Sat.)	Excelsior High School
22 May (Sat.)	Garlandale High School
27 May (Thur.)	Athlone High School

Please bring information about where we can go in the Urban Environment to this workshop so that I can start planning our "**SENSING THE URBAN ENVIRONMENT**" fieldtrip.

See you at the workshop,
Yours for the Environment
Fadli Wagiet.

THANKS TO SHAHIED ADONIS OF MASTER COMPUTERS FOR SPONSORING THE PHOTOCOPYING OF THIS NOTICE AND ALL THE LITERATURE YOU WILL BE RECEIVING AT THIS WORKSHOP.

APPENDIX 4.4

URBAN ECOLOGY PROJECT

1 May 1993

NOTICE OF WORKSHOP

Dear .....

The workshop will take place at **14h30** on **Thursday**, the **6th** of **May** at **Westridge High School**. Westridge High(tel.no.317400) is in Silversands Avenue, Westridge in Mitchells Plain. The contact teachers at Westridge High are Keith Mert(319904), Evan Fester(752213) and Donavan Fullard(341589). Please make the necessary arrangements with your principal to be on time for the workshop.

The proposed agenda for this workshop is as follows:

1. Welcome .....Donavan Fullard
2. Why do we teach Ecology? ..... Fadli
   - 2.1 Aims of Education and Teaching.
   - 2.2 Tibilisi Principles.
   - 2.3 The role of resources in Education.
3. Looking at constraints that could impede the implementation of the project. ..... Fadli
   - 3.1 The skills we require for this project.
   - 3.2 The constraints within the school system.
4. Evaluation of workshop and agenda for next workshop.
5. Any other matters.

The revised dates of the workshops are as follows :

DATES	VENUES
6 May (Thur.)	Westridge High School
22 May (Sat.)	Fieldtrip
27 May (Thur.)	Garlandale High School
29 May (Sat.)	Athlone high School

See you at the workshop,

Yours for the Environment

Fadli Wagiet.

THANKS TO SHAHIED ADONIS OF MASTER COMPUTERS FOR SPONSORING THE PHOTOCOPYING OF THIS NOTICE AND ALL THE LITERATURE YOU WILL BE RECEIVING AT THIS WORKSHOP.

APPENDIX 4.5

URBAN ECOLOGY PROJECT

11 May 1993

NOTICE OF "SENSING THE URBAN ENVIRONMENT" FIELDTRIP

Dear .....

The fieldtrip will take place on Saturday, 22nd May and we must all meet at 8h30 at Hewat College at the front gate in Kromboom road. Please bring along a clipboard and entrance money for Rondevlei Bird Sanctuary.

The proposed program will be as follows :

SITES	PRESENTERS
1. Nantes Park (Silvertown)	Billy Morkel (Alexander Sinton)
2. Belgravia High	
2.1 Squatter Camp	Fadli Wagiet (Belgravia) and Razeena Wagiet (Hewat)
2.2 Canalised River	Fazela Abrahams (Belgravia) and Max van der Ross (Ned Doman)
2.3 Industrial Area	Reagan Ford (Belgravia) and Vincent Hendricks (Athlone)
3. Westridge High	
3.1 Dunes	Donny Fullard (Westridge), Keith Mert (Westridge) and Muzaina Essop (Excelsior)
4. Rondevlei Centre	Colin Davids (Steenberg)
5. Fairmount High	
5.1 Cemetry	
5.2 Acacia veld	
5.3 Contrasting housing complexes	Lesley Le Grange (Fairmount)
6. Oaklands High	
6.1 Wetlands	Chris Reddy (Oaklands) and Richard Engel (Oaklands)
6.2 School grounds	Claudine Carolus (Oaklands) Mark Vlotman (Princeton)
7. Rondebosch Common	Bersan Lesch (Garlandale) Elmary Buis (Immaculata) Fazlyn Dirk (Spes Bona)
8. Liesbeeck River	Theo Manuel (Ned Doman) Ismail Mathews (Ned Doman)

Please do not forget to bring 'padkos' along.

See you on the fieldtrip,
Yours for the Environment

Fadli Wagiet.

APPENDIX 4.6

URBAN ECOLOGY PROJECT

21 May 1993

NOTICE OF WORKSHOP

Dear .....

The workshop will take place at **15h00** on **Thursday**, the **27th** of **May** at **Garlandale High School**. Garlandale is in General street in Athlone (Please see attached map for directions). The contact person at Garlandale is Bersan Lesch (Tel. no. 6967908-school & 7978542-home).

The proposed agenda is as follows :

1. Welcome .....Bersan

2. Constraints within ourselves to realize the project. ..... Fadli

3. Constraints within the Education/School system that can impede the implementation of the project. ..... Bersan

4. Evaluation of workshop.

5. Any other matters.

See you at the workshop.

Yours for the Environment

Fadli Wagiet.

THANKS TO SHAHEED ADONIS OF MASTER COMPUTERS FOR SPONSORING THE PHOTOCOPYING OF THIS NOTICE AND ALL THE LITERATURE YOU WILL BE RECEIVING AT THIS WORKSHOP.

APPENDIX 4.7

URBAN ECOLOGY PROJECT

25 May 1993

NOTICE OF WORKSHOP

Dear.....

The next workshop will take place on **Saturday** the **29th** of **May** at **Athlone High School** in Calendula street Q-Town. The proceedings will start at 9h00. Please see the attached map for directions.The contact person at Athlone High is Vincent Hendricks (Home-phone no.- 721569 / School-phone no.-6376930)

The proposed agenda for the meeting is as follows :

1. Welcome ..... Vincent

2. The development of resources for different Urban Environments. ..... Fadli

3. Working in interest groups.

4. Report back from various groups.

5. Where do we go from here?

It is going to be essential that you attend this workshop as it will be the culmination of what we have been doing for the last five meetings/workshops.

See you at the workshop.

Yours for the Environment

Fadli Wagiet

THANKS TO SHAHEED ADONIS OF MASTER COMPUTERS FOR SPONSORING THE PHOTOCOPYING OF THIS NOTICE AND ALL THE LITERATURE YOU WILL BE RECEIVING AT THIS WORKSHOP.

APPENDIX 4.8

URBAN ECOLOGY PROJECT

31 August 1993

NOTICE OF MEETING

Dear .....

The meeting will take place at 9h00 on Saturday, the 4th of September at the Wagiet's residence. The meeting will be followed with lunch.

The proposed agenda for this meeting is as follows:

1. Welcome ..... Fadli

2. Evaluation of the project

3. " The road ahead for us ? "

4. Any other matters.

Please find the following with this notice :

(i) An outline of our programme.
(ii) The schedule of the semi-structured evaluation interview.
(iii) A copy of the CORE DEMOCRATIC VALUES of John Fien.

See you at the meeting.

Yours for the Environment

Fadli Wagiet.

APPENDIX 5

LIST OF LITERATURE

1. The research proposal.
2. Summary of interviews.
3. Chapter 14 of Critical reflections on teachers in action: An evaluation report of the Natal Primary Science Project.
4. A teacher's perspective on curriculum development - Nazim Ebrahim.
5. Teachers and curriculum development - Margaret Keogh.
6. Approaches to ecology teaching: the educational potential of the local environment - Monica Hale.
7. Curriculum development and action research - Fadli Wagiet.
8. Summary of report back on possible topics for the workshops.
9. An oasis of life in Intergrating Naturally - Kath Murdoch
10. Talk on Environmental Education - Razeena Wagiet.
11. Can we change biology teaching by changing the matric exam? - Martie Sanders.
12. Chapter one of The Right to Learn - Pam Christie.
13. A reply to 'omgewingsopvoeding as 'n onderwysstrategie' - A J Clacherty.
14. Relevance in Biology Education - D. Schreuder.
15. Teaching Biology in the next Century - C N Watson.
16. Three approaches to Education.
17. Ecology projects.
18. Urban ecosystems.
19. Chapter 5 - The Habitable World: Human Settlements, urban water supplies, solid waste, urban pollution and health in Exploring the Earth Summit - Rachel Wynberg.
20. Environmental Projects: Pleasure or Problem? - Linda Paxton.
21. Urban Conservation - Enviro Facts 55.
22. Chapters on Pure Air and Clean Water in the International show-and-do conservation project kit.
23. Handouts of the 'Sensing the Urban environment' fieldtrip.
24. Core democratic values.
25. Schedule of semi-structured evaluation interview.
26. What did we do so far?

NANTES

APPENDIX 6.1

Public Open Space in high density area

Broad meaning that can be given to EE is one that includes

① Physical

Atmosphere | Wind
Soil - slope | Aspect - gradient - characteristics of soil.
Water - permanent or temporary water on site - water flow, quality - Sediment load | Odours
Counting/measuring graphing | Changes in conditions - day/night - Seasonal changes
Patterns of light + shadow | Renewable and Non-renewable resources.

② Biological

Vegetation - description - Do plants tell us about climatic + environmental conditions - Shade communities | leaf litter.
Evidence of animals using site. | Animal behavior - Nesting feeding | territoriality | Aquatic communities - levels of pathogens
Features that might vary with seasons
Cycles in nature. - water cycles | Nutrient cycles | Food chains | webs
Soil | Mud Communities | Bank or riparian Communities
Where evidence of urban conservation + neglect can be seen. | Illegal | Noise | Air pollution

③ Social

Public interaction and interest in Open Space
Is site used by humans - evidence | Do they damage site
For what type of activities is site suitable.
Commercial | Residential units bordering site. - impact on sight
What facilities are available. | What benefits are there for society in this habitat
Pedestrian Count | traffic Count. | traffic Congestion and patterns around site.
Quality of life considerations for local population

④ Economic

Unemployment - gangsterism | loitering
Commercial use of land preferred.
Enough Space. | Is the land given up as public Open Space benefitting developers as well as community
Water recycling

Cultural

Sketching | Photography | Creative Writing - Use of five Senses
Sounds | Colour | Art projects | Using environment as inspiration for art. | explore aesthetics of environment. Projects: posters, murals, sand modelling
Sculpture - Use of shells | branches | bark in art.
Dramatisation - expressive skills - creating.

Historical

History of site | Historic development of site
Government role in management
family biographies.
Community plans
Appreciation of rocks + origin
Cultivation of values

Political

Group Areas Act. | People on the move.
Future development of area
Impact study of increase in pop. density. | Squatters on site?

- aware recognise
- appreciate respect
- analyse comprehend evaluate
- consult
- support
- participate
- cultivate skills and attitudes

Survival information

Water is W Cape's most precious natural resource and the biggest factor limiting development

Commitment to participate in projects or programmes that maintain or improve the quality of the local environment.

APPENDIX 6.2

SQUATTER CAMPS

" By the end of this decade, half of the world's population will be living in cities.....Most of this increase has occurred in the developing world. Unlike urbanisation in developed countries, urbanisation in developing nations has outpaced industrial expansion. The consequences of this are : squatter settlements, overcrowding, inadequate shelter, water and sanitation facilities, growing amounts of uncollected waste, deteriorating air quality, and throngs of underemployed and unemployed people. In 1988, one quarter of the total urban population lived in poverty.....By the year 2010, an estimated 70 -80% of the population will be living in cities. Presently, some 40-50% of the urban population live below the poverty line..... At present approximately 20% of the total urban population of 22 million have no access to water facilities, 33% have minimal sanitation facilities and 70% of the urban black population have no direct access to electricity. "

Rachel Wynberg(1993).

The most serious urban environmental problems are found in squatter camps viz. urban water supplies, sewage and solid waste management and urban pollution and health.

WHAT DO WE DO? DO WE TALK ABOUT IT OR STAY WITH OUR HEADS IN THE GROUND AND HOPE THE PROBLEM GOES AWAY. IT WON'T. OUR PUPILS ,WHO WILL BE THE FUTURE LEADERS, NEED TO RESEARCH THIS PROBLEM IF THEY ARE GOING TO HAVE ANY CHANCE OF SOLVING THIS PROBLEM.

WHAT CAN BE DONE IN A SQUATTER CAMP?

Information :

Human impact on the environment, circle of poverty, water supply, removal of solid waste and sewage, urban pollution(air pollution, dumping and water pollution), environmental health, unemployment, deforestation-energy problems,.....

Core Democratic Values :

open-mindedness, acceptance of and respect for others, respect for human rights, concern for justice, commitment to sustainable development, and a willingness to get involved.

John Fien(1992).

Which Skills? :

Gathering information, representing data, using factual text as references, co-operating, clarifying values, empathising, presenting a point of view, actively listening, making decisions, solving problems, taking actions, reporting(oral and written), logical thinking, gathering data, interpreting data, observing, questioning and recording and many more.

Kath Murdoch(1992).

APPENDIX 6.2

A POSSIBLE ENVIRONMENTAL PROJECT ON SQUATTER CAMPS.

" If the problem of squatter camps are not solved, the World Bank predicts that urban poverty will be the most significant and politically explosive problem by the next century."

Divide the class into three groups and give each group one of the following tasks :

How did squatter camps come about?

What are the problems that squatter camps cause?

What are possible solutions to the problems?

POSSIBLE PROCEDURE ?

Need to talk to participants who would be interested. At the moment :

Pupils visit squatter camp and the brief is to observe what ever they can.

Discuss their observations.

Discuss the three questions.

Speak to language, library, history and geography teachers about the project and inform them that pupils will be coming to discuss various aspects of this project with them.

APPENDIX 6.3

CANALIZED RIVERS

1. Pollution

-effects on plant and animal life

-absence of variety of plant and animal life

-effects of industrial effluent

-effect of informal settlements

-reason for decline of animal life due to their sensitivity to environmental changes.

2. Plant life

-Canals are concrete enclosures which are fed water through french drains

-due to absence of a soil substrate,(abiotic factor)aquatic life is very limited

-where soil deposits do occur,plant life increases, particularly with reeds and other monocotyledonous plant life

-in fast flowing areas of the canal,where little deposition occurs,only brown algae are found

-canals are often divided into two streams;the faster flowing of the two has less plant life than the other.

-in the slower flowing stream,more deposition occurs and subsequently more plant life occurs.The presence of some dicotyledonous plants were noted as well as some green algae.These were however mostly of a pioneering nature.

-effect of real river banks on the presence of bird life and other animals life.

APPENDIX 6.4

URBAN ECOLOGY PROJECT

20 May 1993

REPORT ON THE POTENTIAL OF THE INDUSTRIAL AREA BEHIND BELGRAVIA HIGH SCHOOL AS A SITE FOR THE DEVELOPMENT OF A RESOURCE FOR THE TEACHING OF ECOLOGY IN AN URBAN SETTING.

When first exploring the area I felt that it had nothing to offer the ecology teacher. Upon further investigation, however, I came to the realisation that the absense of plant and animal life was actually a reflection of the human impact on the natural environment of the area. Surely the area hadn't always been in this state? The following points are a few things that I felt could be done if bringing pupils into this area:

1. Let the pupils list the animals and the plants which they can see. Give the pupils a list of or pictures of the the animals and plants which were originally found in this area.
   They must now write a mini - report on why this area is in the state it is.

2. Show the pupils the pile of tyres lying on the open area opposite "Nolans' Tyres" as well as the tyres lying at the squatter camp. Inform the pupils that the squatters burn these tyres for warmth on cold days. They could then be required to find out which gases and other substances are liberated into the air when tyres are burnt as well as the effects of these gases on human beings. They could at a later stage conduct interviews with the teachers and pupils of Belgravia High as well as with the residents of Belgravia Estate to determine whether there has been an increase in the incidence of chest and lung complaints since the formation of the squatter camp.

3. Give the pupils a map which indicates the location of all the industrial areas in the S.W. Cape. Also give them a worksheet which requires them to note that almost all the industrial areas area situated close to low or middle income residential areas (Except Ndabeni near Pinelands). Ask them if they would live close to an industrial area if they had the choice not to. They must also be made aware of the fact that there are also advantages to living close to an industrial area (travelling to work is cheaper, etc).

4. After teaching a preliminary lesson on underground water show the pupils the spots where large amounts of used motor oil had obviously been poured onto the ground and allowed to seep into the ground. Let pupils investigate the effects of this on the underground water supply. This could be linked to a lesson on drought in South Africa. Also make pupils aware that rain falling on to human waste (such as disposable nappies at rubbish dumps) also seeps into the ground to contaminate a perfectly useable water supply.

I am sure that there are many other possibilities for the teaching of ecology in this and other industrial areas.

R.S. Ford.

APPENDIX 6.5

OAKLANDS HIGH SCHOOL.

WETLAND PROJECT. (WORKSHEET BEFORE 'EDUCATION' TALK)

SITE

The school rugby field, especially the area bordering the fence is being considered for use as an ecology teaching resource. We plan to cordon off this section of the field and to develop it as a "reserve" for use by teachers of all subjects.

ECOLOGY TEACHING.

The area is ideal for illustrating seasonal rhythms.

During summer the field is dry and supports mainly grass species. Some birds are present and some even nest in the areas with longer grass. Annuals (plants) appear in early spring converting the drab field into a riot of colour. The plant species have not been surveyed as yet, but plans are afoot to do this in the near future.

During winter the field is almost totally waterlogged as it forms part of the source of the Kromboom river. Different plants appear during the winter months and the water pools attract a wide variety of insects and aquatic organisms. These can be used for practicals and general observations (Share-Net booklet Hands on: Vlei and Marsh wetlands, Jon Wyatt). The most striking feature is the large number of bird species which visit the area during winter.

RESOURCES.

Some slides (10) are available for comparison of the different seasons as described above.

APPENDIX 6.6

OAKLANDS HIGH SCHOOL.

WETLAND PROJECT. (WORKSHEET AFTER 'EDUCATION' TALK)

The school sports field, especially the area bordering the fence on the western perimeter, is being considered for use as a teaching resource. We plan to cordon off this section of the field and to develop it as a "reserve" for use by teachers of all subjects. It is presently being used by Biology teachers only.

THE SITE

During summer the field is dry and supports mainly grass species. Some birds visit the area and some even nest in the areas with longer grass. Annual plants appear in early spring converting the drab field into a riot of colour.

During winter the field is almost totally waterlogged as it forms part of the source of the Kromboom river. Different plants appear during the winter months and the water pools attract a wide variety of insects and aquatic organisms. The most striking feature is the large number of birds which visit the area during winter.

USEFULNESS OF THE SITE FOR TEACHING

The site can be used for teaching principles of ecology, especially seasonal rhythms. Many other skills can be taught by careful planning of work sheets and practicals. Some activities and the skills which are involved are listed in the table below.

ACTIVITIES	SKILLS
Noting the types and numbers of organisms in an area	Observation and data collection (hands on).
Group work during practicals	Social skills
Interpretation of data (Description)	Research and library
Presentation of data (Orally)	Social, communication.

APPENDIX 6.6

ACTIVITIES	SKILLS
Writing up data as an assignment	Project, writing and research.
Discussions on project and relating this to activities in community.	Communication and debating.
Essays or debates on value wetlands and relation to land needs for other purposes (Housing&Industry)	Research, integration of of knowledge, conservation ethic.

RESOURCES.

Some slides (10) are available for comparison of the different seasons as described above.

Share-Net booklet Hands on: Vlei and Marsh wetlands, Jon Wyatt for assistance with work sheet and project planning.

APPENDIX 6.7

BIOLOGIE: TAAK .... RIVIEREKOLOGIE, VOEDSELKETTINGS EN BESOEDELING IN 'N AKWATIESE EKOSISTEEM bv. Liesbeeck Rivier.

DOEL: 1) Om Riviere kologie te bestudeer
Wiffie 2) Om "Besoedeling" te bestudeer d.m.v. veranderings in die biotiese (plante en diere) en abiotiese ('water helderheid') faktore
3) Om verskillende spesies in die rivier te bestudeer om 'n voedselketting(s) te konstrueer.

METODE: -Gebruik nette om plant en dier materiaal te verkry.
-Gebruik van 'n skaal (1-10) om waterhelderheid te beskryf, waar 1 kristalhelder voorstel en 10 baie donker en besoedeld aanoui (Verwysingsbron 1).
-Gebruik verwysingsbron 2 om verskillende spesies wat gevind word, te identifiseer.

Rivierekologie en Besoedeling (10 van die 20 punte)

Beantwoord die volgende vrae nadat jy die rivier bestudeer het.

1) Waarom is die groter plante raar in die boonste vlakke van die rivier? (2)

.....
.....

2) Waarom is die visse raar in die boonste vlakke? (2)

.....
.....

3) Amper al die lewe wat gesien kan word bestaan uit insekte. (die Algemeenste is die onvolwasse stadiums). Noem twee tipe insekte wat gevind kan word). (2)

.....
.....

4) Gebruik Verwysingsbron 1. Wat is die waterhelderheid in die boonste vlakke van die rivier? (1)

.....

5) Wat is die waterhelderheid in die laer vlakke? (1)

.....

6) Dink jy dat besoedeling ingetree het in die Liesbeeckrivier van die boonste tot die laer (onderste) vlakke? As dit so is, wat sal jy doen om hierdie probleem die hoof te bied as dit nou wel voorkom? (1+1=2)

.....
.....

APPENDIX 6.7

Konstruering van voedselketting(e) van dier-en-plant spesies in die Liesbeeckrivier ** Gebruik Verwysingsbron 2 vir ID.
(10 van die 20 punte)

Bestudeer die Rivier en beantwoord die volgende vrae.

1) Watter organiese materiaal val in die rivier en begin die voedselketting? (1)

.....

2) Tot watter trofiese vlak behhort die organiese materiaal(1)

.....

3) Hierdie organiese materiaal word opgevreet deur "raspers" en "weiers" in die nabye omgewing. Noem een raspar of weier. (1)

.....

4) Tot watter trofiese vlak behoort die raspers en weiers? (1)

.....

5) Raspers en weiers word meegesleer deur die rivier en word gevreet deur

.... wat tot trofiese vlak drie behoort(1)

6) Die organismes in vraag 5 dryf verder die rivier af en word

gevreet deur..... ..... wat tot trofiese vlak vier behoort. (1)

7) Gebruik nou jou informasie van vrae 1 -- 6 en die diagramme in Verwysingsbron 2, en konstrueer 'n voedselketting deur gebruik te maak van die organismes wat jy teegekom het.

(4)

APPENDIX 6.7

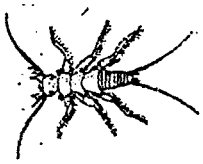
APPENDIX 1 / VERWYSINGSBRON 1

1 2 3 4 5 6 7 8 9 10

<--->

1= Totally clear / totaal helder
2= clear but 10% less visible / helder maar 10% minder sig
3= clear but 20% less visible / " " 20% " "
4= clear but 30% less visible / " " 30% " "
5= less clear, can still see organism / minder helder, kan steeds organisme sien
6= organism distinguishable 40% visibility / organisme sienbaar 40% sig
7= 30% visibility organism barely visible / 30% sig organisme net sigbaar
8= 20% visibility organisms barely,barely visible / 20% sig organismes net-net sigbaar
9= 10% visibility nothing seen / 10% sig niks te sien nie
10= absolutely nothing seen / absoluut niks te sien

APPENDIX 2 / VERWYSINGSBRON 2
Organisms recognisable in the Liesbeeck River
Organismes herkenbaar in die Liesbeeckrivier

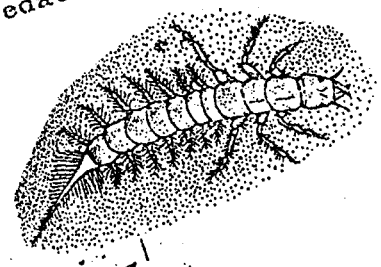


Stonefly nymph
Steenvlieg nimf

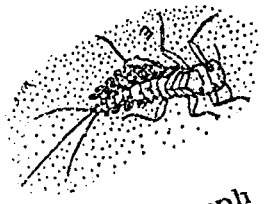
Caddisfly larva
Caddisvlieg larwe

Predatory insect
Predatoriese insek

Beetle larva
"Beetle" larwe



Alderfly larva
Aldervlieg larwe



Mayfly nymph
Mayvlieg nimf

Predatory fish
Predatoriese vis

Leaves / blare

APPENDIX 6.8

RONDEBOSCH COMMON

Elmary Buis
Fazlin Dirk
Bersan Lesch

History

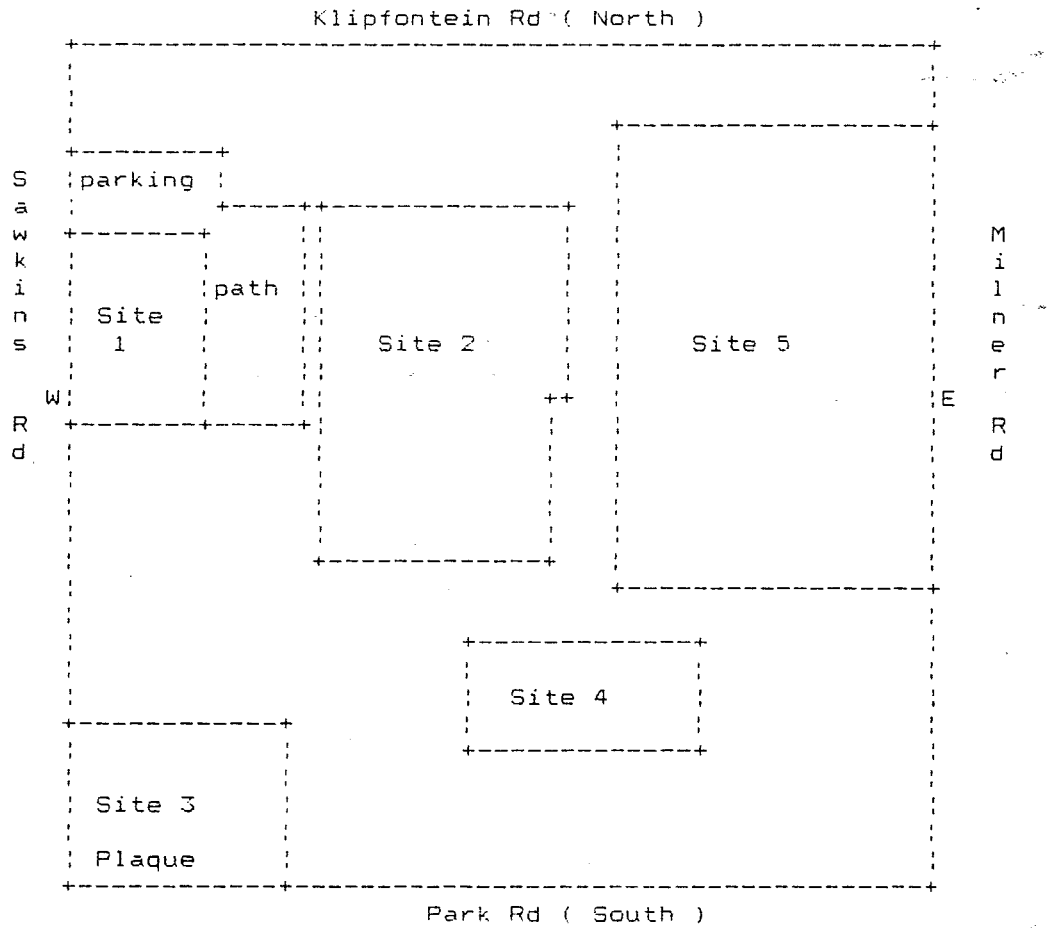
The Rondebosch Common is held in trust as an open space for informal recreation by the public.
Flora and fauna are protected .
Fires are not allowed .
Vehicles are not allowed on the common.
Rubbish/litter may not be deposited .
Livestock may not be permitted to stray /graze on the common.

By Order of the City Council

Rondebosch Common is part of an area used as Camping ground by Genl. J.W. Janssens' Batavian troops in 1805 and by British troops in 1806. In 1855 grazing rights on the common were granted to the Rector of St. Paul's Church, Rondebosch on condition that the public will always have access to the area.

Plaque : Historical Monuments Commission -1965

MAP OF THE COMMON
(not drawn to scale)



APPENDIX 6.8

SITE 1
- public recreational area - ideal place for a CLEAN - UP

- Pine trees
  - use uprooted tree to study the root system
  - study the root system without root hairs
  - study the decaying bacteria working on dead trees
  - sparse vegetation under pines (study the influence of soils)
  - high leaf litter (pine needles) (nutrient recycling)
  - small pines growing around parent trees (competition)
  - nests in the trees (commensialism)
  - biotic diversity limited (mainly grasses)
  - fungi growing on dead trees/organic matter (saprophytes)
  - study annual rings /xylem/phloem on trees
  - drainage from area - down to the Liebeeck??
  - Common a sponge for Liesbeeck ??????
  - soil - red/clayey

SITE 2
- Open grass field
  - a degree of succession (mosses-grasses- flowering plants)
  - a disturbed area with few fynbos remnants (indigenous vegetation)
  - water logged in winter (soil types/ water table)
  - paths used by people / dogs
  - soils - clayey - dark

SITE 3
- extreme south western part of Common
  - fynbos remnants present eg. <u>Metalasia sp</u>
  - Geraniums present (spread from gardens???)
  - Buffalo grass (indigenous)
  - mole heaps
  - soil more sandy than Sites 1 or 2

SITE 4
- cluster of pines at southern end (opp. Scripture Union Building)
  - young pines forming a thick cluster (seedlings of taller trees ????)

SITE 5
- eastern part along Milner Rd
  - sandy soils
  - restios widespread

GENERAL:
- Ideal for comparative soil studies
- a real management plan needed to restore indigenous fauna and flora
- use of pine trees for Gymnosperm studies
- use of this as an open space for walks/jogs
- not ideal outdoor experience(roads too near)
- only couple of <u>Acacia sp</u> on northern end (Is this place managed/mismanaged)
- GREAT POTENTIAL - if PROPERLY MANAGED

SCHEDULE OF SEMI-STRUCTURED EVALUATION INTERVIEW

WORKSHOPS

1.1 Did you find any of the workshops beneficial?
1.1.1 If yes, please elaborate which ones and why?

1.2 Were there any of the workshops that you did not find beneficial?
1.2.1 If yes, please elaborate which ones and why?

1.3 Were there any aspects of the workshops that you liked or disliked?
1.3.1 Please elaborate on your answer.

1.4 Were there any specific topics addressed in the workshops that were of great value to you?
1.4.1 If yes, please elaborate which ones and why?

1.5 Were there any topics that was of no value to you?
1.5.1 If yes, please elaborate which ones and why?

1.6 In your opinion, was the workshops :
1.6.1 Sufficiently participatory and practice based?
1.6.1.1 Please substantiate your answer.
1.6.2 Sufficiently enquiry based?
1.6.2.1 Please substantiate your answer.
1.6.3 Sufficiently critical?
1.6.3.1 Please substantiate your answer.
1.6.4 Sufficiently collaborative?
1.6.4.1 Please substantiate your answer.

TIME

2.1 Were the times scheduled for the workshops appropriate for you?
2.1.1 Yes or no, please clarify your answer.
2.2 If your answer is no to question 2.1, suggest an alternative time that might have suited you better.

2.3 We could not address all the topics identified by you in the six workshops.
2.3.1 Do you think that we should address the other topics?
2.3.2 If yes, how do you suggest it should be done?

LITERATURE

3.1 Naidoo (1992) found that gaining access to literature by the teachers as one of the problems in the action research project he was involved in.
3.1.1 To what extend did we address this problem?
3.2 If yes:
3.2.1 Did you have time to read the literature?
3.2.1.1 Please elaborate on your answer.
3.2.2 Did you find the readings useful?
3.2.2.2 Yes or no, please elaborate.
3.2.3 Are there other ways that you can suggest we address this problem.

PERSONAL GROWTH

4.1 Why did you stay with the project?

4.2 Was any of your expectations met during the project?
4.2.1 If yes, please elaborate.
4.3 Were any of your expectations not met?
4.3.1 If yes, please elaborate.

4.4 Did you develop any skills during the project?
4.4.1 If yes or no, please elaborate.

4.5 Did your perceptions change as the project developed?
4.5.1 If yes or no, please elaborate.

4.6 Did the project influence your teaching in any way?
4.6.1 If yes or no, please elaborate.
4.6.2 Did you attempt any innovations discussed in the workshops?
4.6.2.1 If yes or no, please elaborate.
4.6.2.2 If yes, did it cause any problems at your school?

4.7 Did it alter your understanding of your role as a teacher?
4.5.4 If yes, please elaborate.

4.8 Do you feel that this group has a role to play in the future?
4.8.1 Yes or no, please elaborate .

4.9 Is there anything which was not covered by the interview that you would like to share with me about the project?

URBAN ECOLOGY PROJECT

ATTENDANCE REGISTER

Facilitator: Fadli Wagiet
Home tel: 349414; Work tel: 6965118

Name	School Represented	Personal Address	Personal Tel. No.

CURRICULUM DEVELOPMENT AND ACTION RESEARCH

ARE WE INVOLVED IN A CURRICULUM DEVELOPMENT PROJECT?

To be able to answer this question we have to ask ourselves : What is a curriculum? There are various views on this topic as shown by the following two definitions viz.

A curriculum.....is a scientifically-based written programme for teaching and learning, comprising the aims, relevant and organised content selected for this purpose, as well as didactical guidelines.

(TED, 1988)

This is a very narrow view of curriculum which is decided by experts. It seems to want to control what is happening in schools and is nothing more than a sophisticated syllabus.

The curriculum.....comprises all the opportunities for learning provided by a school. It includes the formal programme of lessons in the timetable.....and the climate of relationships, attitudes, styles of behaviour and the general quality of life established in the school community as a whole.

(DES, 1980)

This is a more broader view of curriculum which includes the formal curriculum and the hidden curriculum (ethos of the school).

The definitions of Holt (1980) and O'Donoghue and McNaught (1991) are most appropriate for this project viz.

The curriculum of a school is the whole set of experiences by which pupils are educated.

(Holt, 1980)

This is an all encompassing definition that is not prescriptive like the curriculum of TED. It sees the school as part of the community and realises that there are many factors that influences the learning experiences of the child.

Any initiative which sets out to influence the school system falls within the ambit of curriculum development.

(O'Donoghue and McNaught, 1991)

Our initiative, developing resources to utilise the Urban Environment, will influence the educational experiences of the child and the school system. Hence, in the mind of the researcher, we are involved with a curriculum development programme.

DIFFERENT APPROACHES TO CURRICULUM DEVELOPMENT

There are a number of approaches to curriculum development, however we will confine ourselves to three approaches.

(A) Research Development Dissemination Adoption (RDDA)

The RDDA approach to curriculum development follows the Technological perspective of curriculum. (See notes on Perspectives on Curriculum). This approach has been characterised by a lack of success world wide (Papagianis, Klees and Brickel 1982). The possible reasons for this are :

(i) It is a centre-to-periphery process (top-down) approach that assumes the planners of the innovation knows what are our (teachers) problems and the solutions for them. The teachers are not part of the development of the innovation and this works against the teachers taking ownership of the new innovation. Fensham (1992) believes that a project should be "owned" by the implementors of that project if it has any chance of success. In this context,"Ownership" means that the project is largely conceived by the participants and is under their democratic control.

(ii) It does not account for the context variation of the users (teachers). All schools are the SAME?

(iii) There is often no communication between the planners of the curriculum innovation and the implementers (teachers) of it.

(iv) Teachers are treated as technicians. They must only know how to implement the innovation and not WHY and HOW it was developed.

(B) RDDA with an ENABLING COMPONENT

Many organisations are producing resources by specialists/experts and then running workshops with teachers to enable them to use the resource. Enablement has been described as what one person does to another. Thus the enabler(developer of the resource) passes on the necessary tools, knowledge and/or skills to the recipient(teacher) to enable the teacher to perform a specific task or role. In this case, the enabler has the power as he/she controls the body of knowledge to be passed on. The teacher is therefore placed in a more passive role and does not develop the necessary skills required for resource development.

(C) PARTICIPATORY ACTION RESEARCH

What is Action Research? Hulzer(1984) defines it as :

" Research INTO practice, BY practitioners, FOR practitioners."

This introduces the concept of the TEACHER AS THE RESEARCHER, an idea extensively promoted by Stenhouse(1975).

Grundy and Kemmis(1981) states that Action Research ...

" ....aims at improvement in three areas viz.
the improvement of the practice,
the improvement of the understanding of the practice by the practitioners and

the improvement of the situation in which the practice takes place."

For more information on the principles of Action Research read the notes on staff seminar on Critical Theory and Action Research presented by B.Janse van Rensburg(1992).

POSSIBLE REASONS WHY THIS IS AN APPROPRIATE APPROACH

(i) Since the teachers are participating in the development, they are more familiar with the innovation, and confident in implementing and sustaining the innovation.

(ii) The teachers have a greater sense of commitment in implementing the innovation. They have "OWNERSHIP" of the innovation.

(iii) It leads to the development of more appropriate innovations which are realistic and in tune with the context in which teachers work in.

(iv) It promotes the professional development of teachers.

(v) It leads to teacher EMPOWERMENT.

(Naidoo, 1991)

Empowerment is embedded in the belief that each teacher has a meaningful contribution to make to his/her situation and that the teacher is capable of finding solutions to problems faced. Compared to ENABLEMENT, we are talking about teachers having the power over the knowledge by deciding how to use it.

PROBLEMS ENCOUNTED IN AN ACTION RESEARCH CURRICULUM DEVELOPMENT PROJECT

(i) Time restrictions : teachers have a large work load hence imposing a time restriction.

(ii) General apathy : some teachers are apathetic about participating due to reasons ranging from authorative school administration and to a lack of commitment by teachers.

(iii) Lack of skills : teacher education programmes both preservice and inservice do not deliberately develop skills required for curriculum development in teachers as this will mean that the government/department will not have control over the curriculum.

(iv) Lack of information : teachers do not have access to the latest information and research findings in education.

(v) Disempowerment of teachers : systematically over a period of time teachers become deskilled and disempowered as a result of:
- the lack of or the limited participation by teachers within the RDDA model of curriculum development followed by the Education Departments in South Africa.
- the imposed centralised bureaucratic control.

(vi) Victim ideology : teachers see themselves as victims to curriculum changes rather than initiating these changes as a result of the following notions :
change is brought about by systems or authority and not by individuals.
experts and not teachers can initiate change. Who are the experts in the"classroom"? The teachers or outsiders?

(Naidoo, 1991)

THE METHOD OF ACTION RESEARCH

The recurrent cycles of the four phases form the Action Research Spiral, in which the knowledge from one cycle informs the strategic action of the next cycle. The four phases are :

(i) PLANNING PHASE : An educational activity is identified by teachers in which improvement is deemed necessary and possible.

(ii) ACTION PHASE : The plan is put into practice in an educational setting.

(iii) OBSERVATION PHASE : there is a need to monitor and document the process taking place.

(iv) REFLECTION PHASE : Information collected during observation phase is examined and analysed. This leads to the planning phase of the next cycle. This is an example of formative evaluation and not summative evaluation which is so prevalent in our education.

(Robottom, 1992)

See Action Research Spiral diagram on handout of staff seminar on Critical Theory and Action Research.

Lecture given by Fadli Wagiet on 15/4/93 at Belgravia High as part of a Resource Development Project.

APPENDIX 10

E.E. TALK

Historical Background

There has been widespread consensus for several years that amongst the greatest problems facing the earth are environmental ones. These include for example:
* pollution of water, land air and living organisms, and related health problems;
* destruction of species;
* depletion of resources;
* overpopulation and the inability of the land to feed its people
* poverty and hunger.

This growing awareness of the environmental crisis gave rise to the question of human and eventually planetary survival.

Since the 1960's a global awareness of the negative impact which humans exerted on the environment gained prominence.
Out of this increased awareness, environmental education emerged as a discrete quest, with some of the major events being the:
* Conference at Stockholm [1972]
* Conference at Belgrade [1975]
* Conference at TBILISI [1977]

At the World Inter-governmental Conference on Environmental Education held at Tbilisi, in October 1977, the eleven guiding principles for effective E.E. programmes were accepted [see hand-out].
These 11 principles form the basis for the education component of Agenda 21 -global framework for action adopted by UNCED- United Nations Conference on Environment and Development/ [Earth Summit] at Rio in June 1992.

What is Environmental Education

Embraced here are two words: environment and education

"Environment"

The popular conception of the term has become equated with nature and ecology over the years.
Today, however, the emphasis has shifted, and the environment is interpreted as more than nature and natural systems, as it includes people and our social systems.
Certain views on the interpretation of the *"environment"* internationally and locally support this shift, for example

Internationally:
"Whether we live in the centre of a large city or on the edge of a forest, the physical environment starts at our front door, making environmental issues which are concerned with our surroundings, both physical and social, rather related to "nature" [Weston, 1986].

"The environment is what surrounds us materially and socially, and should be understood as the conceptual interactions between our physical surroundings and the social, political and economic forces that organise us in the context of these surroundings" [Di Chiro, 1992].

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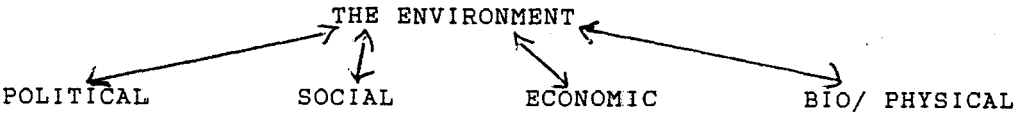
Locally: [O'Donoghue and McNaught, 1991]



Having discussed the context of the word environment, what then is ENVIRONMENTAL EDUCATION [E.E.]
There are many definitions of environmental education ranging from:

"E.E. is concerned with everything that influences environmental learning" [VEEC]
to more comprehensive definitions, i.e

"E.E. attempts to foster clear awareness of and concern about economic, social, political and ecological interdependence in urban and rural areas, to provide every person opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; to create new patterns of behaviour of individuals, groups and society as a whole towards the environment" [UNESCO, 1977].

From the above it is evident that E.E. is concerned about knowledge and also feelings, attitudes, skills and social action.

To achieve these goals involves the integration of 3 approaches to E.E; i.e Education ABOUT, IN and FOR the Environment.

Education ABOUT the Environment

This approach entail the learning of content to explain certain concepts related to the environment- including the biological and physical facets of the environment. This is where ecology fits in, and this may be the most favoured approach at present- a transmission of facts about the bio-physical components about the environment and environmental issues. Education about the environment should include learning about political, economic and socio-cultural factors, as well as about the ecological ones that influence decisions about how we use the environment [Fien, 1988].

Education IN the Environment

Education in the environment involves teaching methods which attempt to use the environment as a vehicle/ medium for learning. This approach describes any form of environmental investigation which takes place outside of the conventional classroom. Important data gathering skills [observation, using of instruments,] as well as social skills [group work] can be developed via this approach. Greenall [1980] describes the opportunities which contact with the environment can provide:

APPENDIX 10

"the environment can be the place where knowledge about and skills to investigate the environment can be acquired, feelings of concern can be developed, and active participation in environmental improvement can take place"
Fieldwork becomes relevant in this approach, and according to Fien, [1988] provides a link between education **about** the environment and education **in** the environment.

Education FOR the Environment

Education for the environment relates to the improvement and the ~~pre~~servation of the environment. It is concerned with changing patterns of behaviour and attitudes and about encouraging active involvement and participation in real environmental problems and issues [Spork, 1990]. In this approach the learner becomes an agent for change- in favour of the environment. Many environmental educators claim that education **in** and **about** the environment are worthwhile only if they are used to provide knowledge and skills to support education **for** the environment.

Conclusion

Environmental education has become much more complex than it was when it focused on knowledge of the natural environment. It takes a holistic view of the environment by including the social, political, social, cultural, aesthetic and technological dimensions, rather than only concentrating on the biological and physical facets of the environment alone. It seeks to involve people in a socially active, problem-solving, critical and participatory process [Robottom, 1987; Greenall, 1987]. Furthermore it seeks to develop environmentally literate, responsible and accountable citizens.

References

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LECTURE GIVEN BY RAZEENA WAGIET ON THE 22ND APRIL AT GROENVLEI HIGH AS PART OF THE URBAN ECOLOGY PROJECT.

APPENDIX 11

Aims of Teaching Ecology:

8 *. Participation (group) → take action
1 - Observation - increase awareness
2* - Social awareness & responsibility
3 *. recognise / identify problem areas
4 - analyse / break up problem into manageable chunks
5 - understanding
6 - evaluate - question
7. - consult - books / resources
9. - cultivation of skills & attitudes
10. - Make informed decision & develop action programmes

a) Physical
b) Biological
c) Social
d) Cultural
e) Economic
f) Historic
g) Political

} Holistic Attitude

* People must realise that they are part of the environment

* ALL AIMS MUST BE ATTAINABLE

APPENDIX 12

URBAN ECOLOGY PROJECT

11 May 1993

Simone Le Hane
Shell
Cape Town

REQUEST FOR FINANCIAL ASSISTANCE

Madam

The Urban Ecology Project is part of a thesis towards a Masters in Environmental Education at Rhodes University. The title of the proposal is "*Teaching the Principles of Ecology in the Urban Environment : An investigation into the Development of Resource Materials*" and my supervisor at Rhodes University is Prof. Pat Irwin. (Please find a copy of my research proposal and a letter from Prof. Pat Irwin for more details regarding the research project.) The project involves twenty seven teachers representing seventeen schools on the Cape Flats.

So far the project program consisted of the following :

- Interviewing the teachers.
- A meeting on the 15th April at Belgravia High.
- A workshop on the 22nd April at Groenvlei High.
- A workshop on the 6th of May at Westridge High.

Please find the notices of the above meeting and workshops as it will give some insight to the topics addressed so far in this project.

One of the constraints that the teachers identified in using the Urban Environment, is that they do not know what it has to offer for the teaching of Ecology. This necessitated a sensing the Urban Environment fieldtrip so that teachers can become aware of how the Urban Environment can be used as a resource in the teaching of Ecology. This fieldtrip will be taking place on the 22nd of May. Please find the notice about this fieldtrip as it has a complete program for the day.

I have hired a mini-bus for this fieldtrip and the cheapest quotation I received is from R & A Transport (Mr. Achmat-tel. no. 6331118) for R350.

I hereby request for financial assistance for the paying of the bus for this fieldtrip. Shell can be assured that the participants of this project feel accountable to the rest of the teaching fraternity and we hope to hold a workshop at the end of this project to share what ever we have gained with other teachers.

Hoping on a positive response,

Yours for the Environment
Fadli Wagiet.

WHAT DID WE DO SO FAR ?

1. INTERVIEW :
   - 1.1 ECOLOGY
   - 1.2 URBAN ENVIRONMENT
   - 1.3 RESOURCE DEVELOPMENT
   - 1.4 TOPICS FOR WORKSHOPS

2. THURS. 15 APRIL AT BELGRAVIA HIGH
   - 2.1 CURRICULUM DEVELOPMENT
   - 2.2 ACTION RESEARCH
   - 2.3 TOPICS FOR THE WORKSHOPS

3. THURS. 22 APRIL AT GROENVLEI HIGH
   - 3.1 WHAT IS E.E. ?
   - 3.2 WHAT DO WE UNDERSTAND BY THE URBAN ENVIRONMENT ?
   - 3.3 WHY THE URBAN ENVIRONMENT

4. THURS. 6 MAY AT WESTRIDGE HIGH AND THURS. 19 MAY AT BELGRAVIA
   - 4.1 WHAT IS EDUCATION ?
   - 4.2 THE ROLE OF TEACHING IN EDUCATION
   - 4.3 THE ROLE OF A RESOURCE

5. SAT. 22 MAY – "SENSING THE URBAN ENVIRONMENT"
   - 5.1 NANTES–EXAMPLE OF AN OPEN SPACE
   - 5.2 SQUATTER CAMP
   - 5.3 CANALISED RIVER
   - 5.4 INDUSTRIAL AREA
   - 5.5 DUNES IN WESTRIDGE
   - 5.6 RONDEVLEI
   - 5.7 CEMETERY AND OPEN FIELD BEHIND FAIRMOUNT HIGH
   - 5.8 SCHOOL–GROUNDS
   - 5.9 RONDEBOSCH COMMON
   - 5.10 LIESBEECK RIVER

6. THURS 27 MAY AT GARLANDALE HIGH
   MEETING POSTPONED DUE TO LARGE SADTU RALLY

7. THURS 3 JUNE AT WAGIET'S RES.
   - 7.1 CONSTRAINTS WITHIN OURSELVES
   - 7.2 CONSTRAINTS WITHIN THE SYSTEM FOR IMPLEMENTATION

8. THURS 10 JUNE AT GARLANDALE HIGH
   - 8.1 OUTLINE OF A FO RMAT OF A RESOURCE

APPENDIX 14.1

GUIDELINES FOR OPEN SPACES

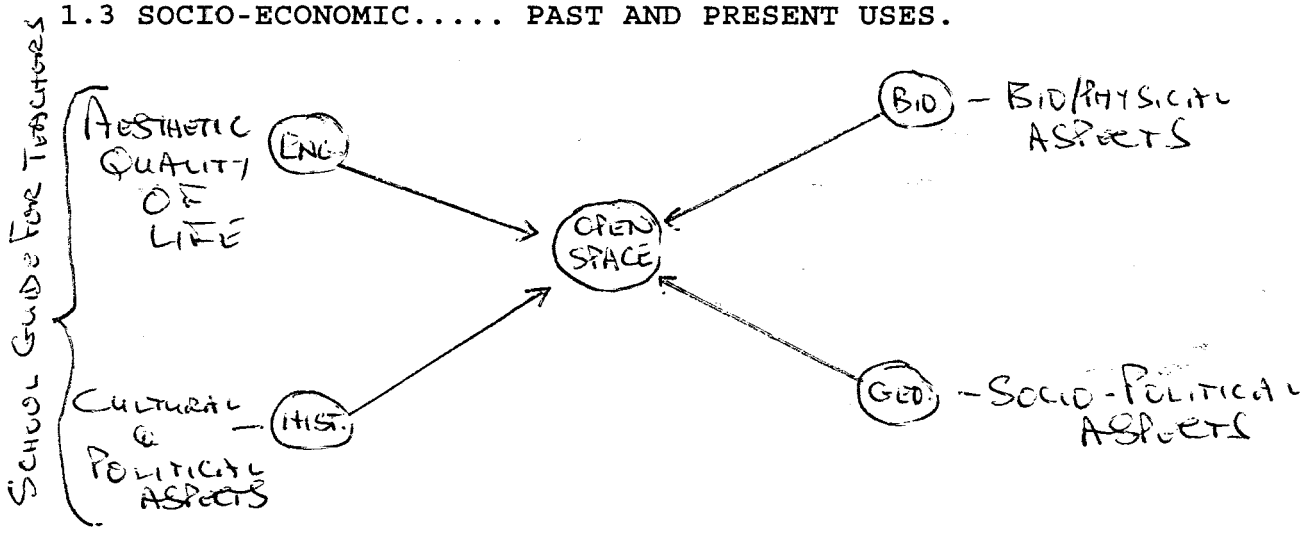
INTRODUCTION:

1.PUPIL ACTIVITY

1.1 CULTURAL HISTRORY.....HOW THE OPEN SPACE CAME ABOUT AND THE CULTURE SURROUNDING THE OPEN SPACE.

1.2 SOCIO-POLITICAL.....COMMUNITY OPEN SPACE INTERACTION.... FEELINGS ABOUT THE SITE.

1.3 SOCIO-ECONOMIC..... PAST AND PRESENT USES.



NEED FOR A SENSING HANDS-ON APPROACH EXPERIENCE.

METHOD :

1. PUPILS ARE GIVEN DIFFERENT TOPICS OF THE ABOVE.
2. ON THE SENSING THE ENVIRONMENT, PUPILS SHOULD PRESENT INFORMATION TO THE GROUP.

* THE OPEN SPACE SHOULD BE THE FOCUS OF A CORE PROGRAMME FOR THE SCHOOL.
* DIFFERENT PROJECTS CAN BE ADOPTED WHICH SHOULD BE DEVELOPMENTAL AND RUN OVER A PERIOD OF TIME.
* DATA COLLECTED SHOULD BECOME PART OF A CENTRAL 'BANK'

APPENDIX 14.2

RIVERS AND WETLANDS

1. CANALISED OR NATURAL .... TRACE FLOW.
2. TEMPORARY OR PERMANENT FLOW .... SEASONAL CYCLES.
3. CATCHMENT .... ACTIVITIES IN THE AREA AND THEIR IMPACT ON THE WATER BODY.

   EFFECTS ON LOWER REACHES OF RIVER.
4. WATER CYCLES .
5. PHYSICAL CHARACTERISTICS OF THE WATER ... pH, TEMPERATURE, SALINITY, SEDIMENT LOAD, QUALITY OF WATER(WATER TEST KIT).
6. LIVING ORGANISMS .... PLANT AND ANIMAL LIFE, FOOD CHAINS & WEBS.
7. SOCIAL ACTIVITIES ..... IMPACT OF SPORTING ACTIVITIES ON RIVERS.
8. CULTURAL ACTIVITIES .... ACTIVITIES OF CERTAIN CHURCH GROUPS.
9. ECONOMIC WORTH AND ACTIVITIES

APPENDIX 14.3

SCHOOL GROUNDS

WHY?

- CIRCUMVENTS MANY COMMONLY VOICED CONSTRAINS:
  - TIME
  - COST
  - TRANSPORT
  - DISRUPTION OF SCHOOL PROGRAM
- PROMOTES AWARENESS OF LOCAL ENVIRONMENT.

HOW?

1. IDENTIFY SIUTABLE SITES FOR TEACHING SPECIFIC ECOLOGY CONCEPTS, BUT WHICH ALSO LEND ITSELF TO SKILL DEVELOPMENT.
2. POSSIBLE FORMAT OF RESOURCE.

GUIDEBOOK FOR TEACHERS.... A5 FORMAT ....EASY TO TAKE ALONG

..... IT MUST BE FLEXIBLE ....FOR SUBJECTS, PEOPLE AND SKILLS

..... OPEN TO INPUT AND CHANGE ... (NOT FINITE)

APPENDIX 14.4

DUNES

WHAT WILL INTEREST GROUP OFFER??

- WORKSHEETS
- IDENTIFICATION CHARTS .... PLANT AND ANIMAL LIFE.
- SLIDES, PHOTOGRAPHS.
- WORKSHOPS ... APPLICATION OF AVAILABLE RESOURCES.
- SOCIAL AWARENESS ... LOCAL COMMUNITY.

INTRODUCTION TO DUNES ????

- HISTORICAL BACKGROUND
- ITS ROLE IN AN ECOSYSTEM

WHAT HAS THE DUNE TO OFFER??

- STUDY OF FYNBOS
- SYMBIOTIC RELATIONSHIPS
- INVADER PLANTS
- ANIMAL LIFE
- SENSING ENVIRONMENT ACTIVITIES
- DEVELOPMENT OF SKILLS...SAMPLING, DATA COLLECTION ETC.
- SOIL STUDIES

GEOGRAPHY CONTEXT :

- AERIAL VIEW OF CAPE FLATS
- CAN SEE DIFFERENT AREAS E.G. CBD, INDUSTRIAL AREA, FARMS, THE COAST, MOUNTAINS ETC.
- AIR POLLUTION

HUMAN IMPACT ON THE DUNES:

- HOUSING DEVELOPMENT
- SQUATTER CAMPS ON THE DUNES
- DUMPING

TEACHING APPROACH :

- PUPIL CENTRED
- ONGOING, DEVELOPMENTAL OVER A PERIOD OF TIME
- LEAD TO POSSIBLE ACTION

APPENDIX 14.5

INFORMAL SETTLEMENTS

(1) Approach – Extent of involvement / Priorities

(2) Why Squatter Camps.
Urbanisation – large % of "urbanites" – Squatters.

(3) Personal reasons – close to school
– Sensitive to human needs
– religion

Aims

1. Open-Mindedness
2. Addressing human impact – problems.
3. Real Life Issues
4. Empowerment.
5. Students identify problems.
6. Organise / Co ordination

APPENDIX 15.I

BIOLOGY AND GENERAL SCIENCE TEACHERS

Dear Colleagues

You are invited to a meeting on the 8th December 1994 (details below) to discuss the planning and implementation of common schemes of work for Biology and General Science in 1995.

MEETING

DATE: 8th December 1994

VENUE: Teacher's Centre, Molteno Road, Claremont (see map).

TIME: 9.00 am till after lunch.

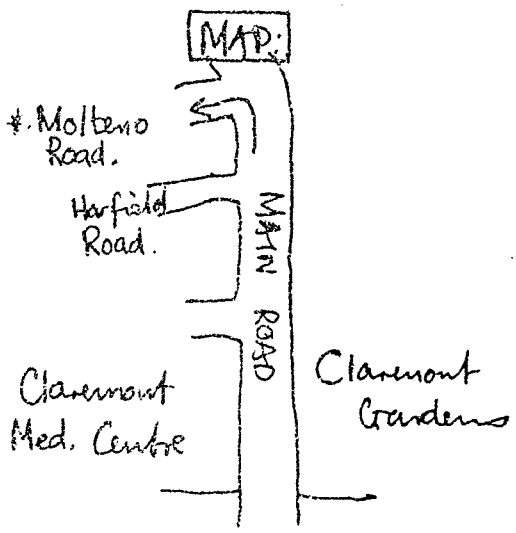
AGENDA:

1. Presentations of proposed schemes:
   - 1.1 Std 6 : C.Kiewiet- Lavender Hill
   - 1.2 Std 7 : Theo Manuel and Max Vd Ross - Ned Doman
   - 1.3 Std 8 : Bersan Lesch - Garlendale
   - 1.4 Std 9 : Suzette Rademan - Heathfield.
   - 1.5 Std 10: Billy Morkel - Sinton and Fadli Wagiet - Belgravia.
2. Discussion and finalisation of proposed schemes.
3. Preparation for next meeting.

PLEASE NOTE: There is a catering fee of R15.00 per person for refreshments. This will include morning tea, a light lunch and afternoon tea.

Thanks for your co-operation.

Billy, Fadli, Chris & Leslie.



APPENDIX 15.2

MEETING REPORT: BIOLOGY AND GEN SCIENCE TEACHERS
CAPE TOWN TEACHERS CENTRE,
8 DECEMBER 1994

GENERAL

The meeting was attended by 12 participants representing 6 institutions. The business of the meeting involved the presentation, discussion and debate of proposed schemes for Standards 6-10 for 1995. The meeting lasted from 9h30 up to 15h30 with a short lunch break. The schemes for each standard were presented and discussed individually and later the Standard 6-9 schemes were discussed collectively.

The preparedness of the presenters was commendable. It was clear from the start that much thought and effort went into the preparation for presentation, reflecting on the professionalism of the teachers involved. The co-ordinators are applauded for a job well done.

Another outstanding feature was the level and amount of debate that transpired at the meeting. Teachers argued and debated effortlessly in a pleasant atmosphere and displayed almost unbounded enthusiasm for the task at hand. This firmly disputes the notion that teachers are unwilling to try and improve their situations at schools.

The co-ordinators of the various standards undertook to rework the schemes in terms of the suggestions made and to present the revised schemes at a meeting in January.

PLEASE NOTE: IMPLEMENTATION OF THE PROPOSED COMMON SCHEMES IS NOT A PREREQUISITE FOR JOINING THE PROPOSED ASSOCIATION OF TEACHERS OR FOR ATTENDING MEETINGS. PLEASE FEEL FREE TO ATTEND ALL MEETINGS AND TO CONTRIBUTE TO THE DISCUSSIONS.

Thanks for your co-operation
Billy, Fadli, Chris & Leslie.

APPENDIX 15.3

BIOLOGY AND GENERAL SCIENCE TEACHERS

Dear Colleagues

We trust that you had an enjoyable and restful vacation and are now raring to come alive in 1995. To help you channel your energy creatively, you are invited to a meeting on Tuesday 24th January 1995 (details below) to discuss the planning and implementation of common schemes of work for Biology and General Science in 1995.

MEETING

DATE: 24th January 1995

VENUE: Teacher's Centre, Molteno Road, Claremont (see map).

TIME: 2.00 for 2.30 pm

AGENDA:

1. Presentations of proposed schemes:

    1.1 Std 6 : C.Kiewiet- Lavender Hill
    1.2 Std 7 : Theo Manuel and Max Vd Ross - Ned Doman
    1.3 Std 8 : Bersan Lesch - Garlendale
    1.4 Std 9 : Suzette Rademan - Heathfield.
    1.5 Std 10: Billy Morkel - Sinton and Fadli Wagiet - Belgravia.

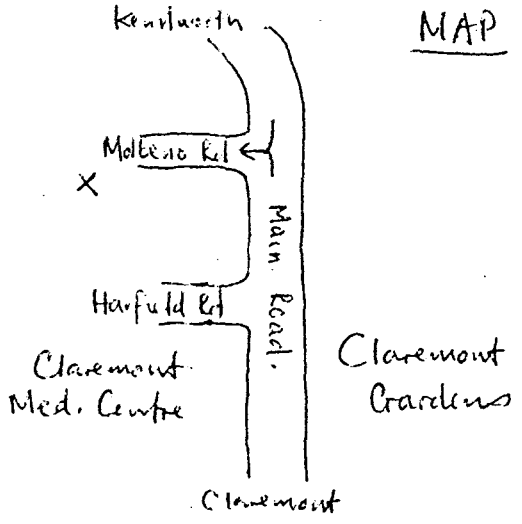
2. Discussion and finalisation of proposed schemes.

3. Preparation for next meeting.

PLEASE NOTE: There is a catering fee of R2.00 per person for refreshments.

Thanks for your co-operation.

Billy, Fadli, Chris & Leslie.



APPENDIX 15.4

MEETING REPORT: BIOLOGY AND GEN SCIENCE TEACHERS CAPE TOWN TEACHERS CENTRE, 24 JANUARY 1995

The committee firstly wishes to extend our apologies to those teachers we could not reach timeously with the notice for the previous meeting. Secondly we would like to wish all teachers of the Muslim faith well over the month of Ramadaan.

REPORT

General

Despite the late notice, the meeting chaired by Fadli Wagiet, was attended by 20 individuals representing 12 schools. The chairperson mentioned a visit from an Escom employee with regard to a project competition. He sketched the details of their discussion which ended with the recommendation that a workshop concerning the mechanics of project work would be more appropriate than a competition at this stage, as the playing fields in this regard were far from level. He also mentioned a call from the media centre of the ex-HOR requesting input and guidance from teachers with regard to their subject needs. They feel that this would assist them to produce resource materials which are in context and usable in the circumstances under which teachers work.

Chris Reddy then welcomed all present and briefly sketched the background to and the progress of the association thus far. Fadli's presentation of the proposed schemes for Std 10 was next, followed by a tea break.

After the interval, the proposed programme was amended due to time constraints. The house decided to allow the individuals to present their proposed schemes briefly, but not to allow time for questions or discussion. It was suggested that all teachers should be provided with copies of the proposed schemes to peruse in their own time and to discuss at their respective schools. It was mentioned that this arrangement would allow people more time to formulate questions and queries which could be tabled at another meeting scheduled for a more convenient time.

APPENDIX 15.4

It was unanimously decided to have the follow-up meeting on Saturday, 4th February at 9h 00 at the same venue. A committee of volunteers offered to arrange the delivery of the notices and reports to the schools and individuals involved in the association.

All in all it was a fruitful meeting which allowed teachers the opportunity to discuss academic matters and some school politics. Exchange of ideas, and marrying of different perspectives is proving to be a valuable spinoff of this association. During a discussion, one participant mentioned that the more experienced (older?) teachers could assist the less experienced (younger?) teachers in the different standards especially at matric level. Another participant mentioned that standard committees seem to be a logical development in the near future.

As usual, the tea break was very welcome and enjoyable. It transpired in a convivial atmosphere, filled with animated discussion and healthy humour, which temporarily lifted the heavy clouds darkening the education horizon.

APPENDIX 15.5

BIOLOGY AND GENERAL SCIENCE TEACHERS

Dear Colleagues

Are you experiencing any of the following symptoms ? fatigue, low level of interest, frustration, low expectation of change.

If you answered yes to any ONE of the above, you suffering from a common teacher disorder, viz "beginning of the year blues".

Fear not, it is curable and the vaccine is right here:

You are invited to a meeting on the 4th February 1995 at the Cape Town Teachers Centre, Molteno Road Claremont, to discuss and finalise common schemes of work for Std's 6-10 for 1995.

MEETING

DATE: 4th February 1995

VENUE: Teacher's Centre, Molteno Road, Claremont (see map).

TIME: 9 am (nine o'clock in the morning)

AGENDA:

1. Presentations, finalisation and acceptance of proposed schemes:
   - 1.1 Std 6 : C.Kiewiet- Lavender Hill
   - 1.2 Std 7 : Theo Manuel and Max Vd Ross - Ned Doman
   - 1.3 Std 8 : Bersan Lesch - Garlendale
   - 1.4 Std 9 : Suzette Rademan - Heathfield.
   - 1.5 Std 10: Billy Morkel - Sinton and Fadli Wagiet - Belgravia.
2. Break into standard groups for detailed discussion of work schemes for first term eg. tests, practicals, projects, worksheets etc.
3. Report back and set dates for next meeting.

PLEASE NOTE:

1. Tea and coffee will be provided, charge R2.00 per person
2. Please bring along any relevant resource materials: work sheets, practicals, projects, articles, tests, that would facilitate standard discussions.

Thanks for your co-operation.

Fadli, Chris, Ashley, Cliffy.

APPENDIX 16

BIOLOGY AND GENERAL SCIENCE TEACHERS FORUM.

SUMMARY OF: MEETING DATES, VENUES AND PURPOSE.

MEETING DATE	VENUE	PURPOSE
27 OCTOBER	Alexander Sinton School	Launch of Forum.
15 NOVEMBER	Alexander Sinton School	Report back on other organisations in the field
8 DECEMBER	Teacher's Centre, Claremont	Development of relevant curricula for Biology for Std's 6-9:implementation 1995
24 JANUARY	Teacher's Centre, Claremont	Discussion of proposed curricula and planning of implementation for 1995.
4 FEBRUARY	Teacher's Centre, Claremont	Presentation of finalised curricula Std's 6-~~10~~.9 Discussion of practicals and tests.
7 MARCH	Teacher's Centre, Claremont	Progress report on first term curriculum implementation.
11 MARCH	Oaklands High school	Discussion group: Ecology teaching and resource sharing.
23 MARCH	Kirstenbosch	Std 8 Fynbos seminar: An introduction to fynbos.
24 MARCH	Wildlife Society, Kirstenhof	Plant diversity seminar for Std 9 teachers.
4 APRIL	Teacher's Centre, Claremont	Resource sharing session and planning for second term.
18 APRIL	Teacher's Centre, Claremont	Seminar on continuous evaluation. Discussion of concerns of teachers.
24 APRIL	Grassy Park High School	Finalising Std 6 Curriculum for 1995. Resource sharing.
3 MAY	Heathfield High School	Workshop on Genetics and Genetic engineering.
17 MAY	Teacher's centre, Claremont	Planning of Curriculum for third term.

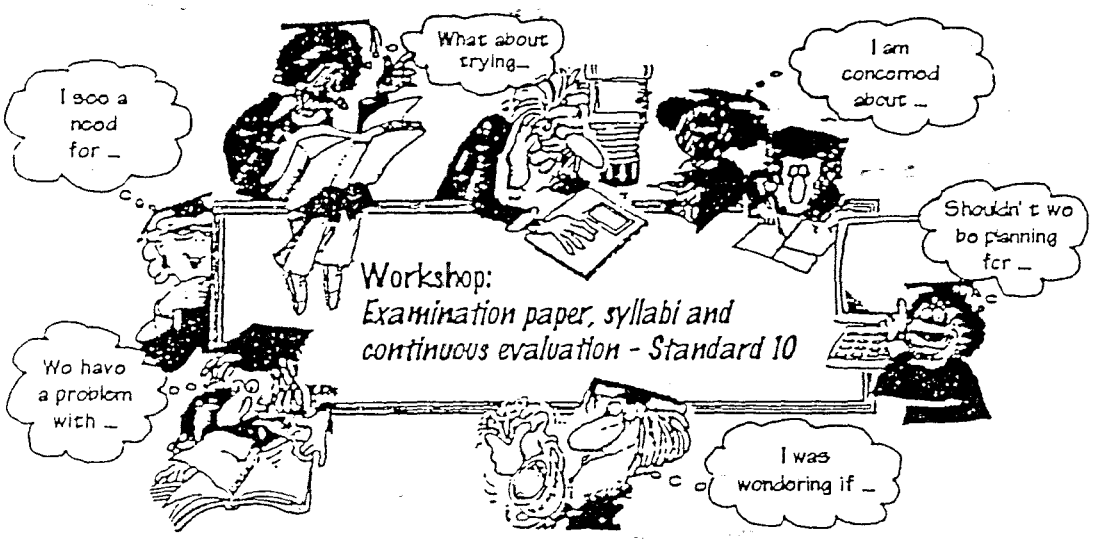
A meeting was held on December between members of the forum and members from South African Association of Teachers of Biology (SATOB) to discuss the formation of one organisation for all Biology teachers in the Cape Peninsula.

APPENDIX 17

WESTERN CAPE EDUCATION DEPARTMENT

To: All Principals
Attention: Head of Department - Biology

BIOLOGY WORKSHOPS



Teachers who teach Biology in std 10 and/ or subject heads are invited to attend the WORKSHOP.

DATE: **Wed. 21 Feb. 1996**
TIME: 9:00 - 15:00
VENUE: **Cape Town Teachers'Centre, Molteno Rd. Claremont.**

PURPOSE: Implementation: Continuous evaluation and interim syllabi for std 10

1. *Continuous evaluation mark for 1996*
   - Which skills/ activities to assess
   - Summative and formative evaluation

2. *Interpretation of the syllabi in standard 10*
   - Educational objectives
   - Syllabi

3. *Format of the question papers*
   - Sections
   - Type of questions

4. *Moderation programmes*

Teachers are kindly requested to study beforehand the relevant documents and to bring them to the workshop.

Although this is a Departmental Course, budgetery constraints make it difficult for claims to be made.

Presenters:- Subject Advisers

Mackie Kleinschmidt
27Punt St.
Diep River, 7945
Ph.:- 751567

Matseliso Semmelink
P.O. Box 23178
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