

# Eliciting Students' Understandings: Necessary Steps in Environmental Education

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One difficulty in conceptualising the scope of environmental education results from the tremendous breadth of environmental issues which need to be addressed. Environmental issues may be considered, for example, in terms of 'an interlinked array of political, social, economic and biophysical environmental factors' (O'Donoghue & McNaught 1991, p.391; see also Di Chiro 1987, p.25). This conception portrays environment as not just natural systems alone, but as 'a human creation, a result of the way we use nature and its resources to satisfy our needs and wants' (Fien 1993, p.3). These conceptual developments are consistent with the growing realisation that environmental issues cannot be understood, let alone addressed, in isolation from social and political values and lifestyle choices (Capra, 1982; Devall, 1988; Guha, 1989). Illustrating this thinking, Livingston (in Evernden 1993, p.xii) portrays environmental issues as analogous to the tips of icebergs: they are simply the visible portion of a much larger entity, where the 'submerged' mass constitutes the fundamental problem, that domain of unspoken assumptions which legitimates the behaviour which precipitates the state of affairs we designate as "the environmental crisis" '. Evernden (1993, p.xii) proposes that a consideration of environmental issues must begin with the recognition that their source 'lies not without but within, not in industrial effluent but in assumptions so casually held as to be virtually invisible'. These interpretations of root causes of environmental issues have important implications for environmental education research and teaching practices.

There is widespread agreement that 'people's attitudes and practices' must change (IUCN, UNEP & WWF 1990, p.20), and these action components are stressed in certain conceptions of environmental education. Thus, education *for* the environment is explicit in its promotion of the "'active resolution of ... environmental problems' (Fien 1993, p.5). However, Jickling (1992; 1991), in calling for a 'more proper distinction between environmental education and environmental advocacy', questions the extent to which action components should be valued as goals of an educational endeavour. A premise of the present study is that if environmental education is to promote any form of action component, this should be promoted in a meaningful and indirect way; I use action in the sense of a 'behaviour with meaning' (Gowin 1981, p.4). By indirect, I mean through encouraging critical analysis of various dimensions of environmental issues, through a two-phase process. The first phase involves analysis of personal beliefs: an

attempt must be made to make these explicit, to enable students to engage in reflection and critique of influences of the social contexts which informed and contributed to their beliefs. The second phase should involve a critical analysis of the various dimensions of environmental issues, along the lines of ideological critique described in Fien (1993). Following this process, students should be better able to account for their choice of action in respect of an issue: such action would be motivated by an informed and critical understanding of their own beliefs in relation to the 'unpacked' dimensions of the issue; Stevenson (1993) argues along similar lines. Thus, an environmental education experience should increase a student's ability to explore and express *why* he or she has chosen a particular course of action in respect of the issue under consideration, and not pre-figure any form of action. This paper reports on research which aims to inform practice of the first phase of such a process.

One strategy to promote environmental education is to include class-wide environmental education-related interventions in teacher education programmes. These interventions aim to encourage *all* student teachers, not merely those who elect to study environment-related courses, to incorporate an environmental perspective in the teaching of their particular subjects and to promote environmental literacy (Clacherty, 1988; Orr, 1992). In South Africa, faculty members in the Department of Education at Rhodes University, Grahamstown, are attempting this in the one year secondary school teacher education programme. This paper reports on interviews which were conducted with pre-service teachers (hereafter referred to as students) in this programme in 1992, being a preliminary phase of a larger study on students' conceptualisations (Robertson, 1992).

### **Rationale for the study**

Environmental education means different things to different people: considerable conceptual diversity exists in the arguments of environmentalists as well as environmental educators. An environmentalist, in Evernden's (1993, p.4) terms, is one who 'experiences a sense of value in nature and is moved to assert the reality of that experience to others'. There are, however, many different 'senses of value', as well as different philosophical perspectives within environmentalism (Fox, 1990; Guha, 1989; O'Riordan, 1989). Similarly, a review of educational literature reveals different conceptions of environmental education: education *about*, education *through* (or, *in*), and education *for* the environment (Fien, 1993; Lucas, 1980). Each conception embodies different values relating to the aims of education in general and environmental education in particular.

The conceptual diversity within environmental education at large underscores the rationale for this study. That is, student teachers who are being encouraged to promote environmental education will, like any group of individuals, conceptualise environment and human-environment relationships

in different ways. This premise is consistent with outcomes of constructivist science education research which show that learners commence educational programmes with prior beliefs and values relating to the programme curriculum, and which claim that these commitments must be made explicit for meaningful learning to occur (Robertson, 1993). From an environmental perspective, such commitments relate, broadly, to how an individual might think about environment and human-environment relationships. It is crucial for environmental educators to take these conceptualisations into account, for, as Evernden (1993, p.35) contends, 'how we act toward the nonhuman is a consequence of our beliefs about how we should act and about what we are acting on'. And in an educational context, Jickling (1991, p.154) argues that 'questions about who we are' and 'our attitudes to non-human components of our environments' are fundamental to any consideration of environmental issues. This paper reports on outcomes of an interview-based study which rests on these arguments.

### **Context of this study**

Socio-political features of the South African environment are inextricably intertwined with this study, and these should be borne in mind when considering its outcomes. The racially inequitable nature of South African society has been described by Turok (1993, p.237) as 'the most distorted socio-economic structure in the world, polarised by apartheid into black and white, privileged and oppressed'. For example, 87% of the land is owned by 'whites', 80% of the country's wealth is owned by 5% of the people, 50% of the population live below the poverty line and 40% do not have paid jobs (Turok, 1993). In education, some 23% of 'black' adults (3.5 million people, 16 years and older) have no schooling, and only about 2.5% have some post matriculation qualification ('The Third Alternative', 1990). Following Khan (1990, p.12), while not subscribing to any tenet of racial separatism and while deploring the divisive nature of racial terminology, such terms are used herein to reflect the existing situation. Although the political situation has changed dramatically since announcement of the reform initiatives in February 1990, legacies of apartheid policies continue to underlie the country's numerous environmental crises (e.g., Cock & Koch, 1991; Hallowes, 1993).

### **Methods**

This study is based on a constructivist epistemology and is overtly qualitative and interpretive; these theoretical foundations are elaborated in Robertson (1993). Interviews were conducted with students in the secondary school teacher education programme at Rhodes University. In 1992, the only explicitly environmental education-related intervention which these students had experienced in the programme was a four-day excursion to an Outward Bound Centre. Interviewees were selected on the basis of different

viewpoints espoused in their responses to three open-ended questions in a questionnaire which the entire class had completed early in the programme. These questions were,

- a) Staff here have an interest in encouraging environmental education. What do you understand by the word 'environment'?
- b) What do you think a programme in environmental education should seek to accomplish?
- c) Please describe one or two environmental issue(s) in southern Africa of particular concern to you.

Ten students were interviewed in October 1992 for approximately 50 minutes each. Each interview began with a question soliciting elaborations to the particular student's questionnaire responses. Subsequently, a sorting exercise, using 20 small cards with a word on each, was used to facilitate discussion of relationships (air, child, dog, eagle, elephant, grass, house, insect, man, Me, mountain, river, road, rock, soil, tree, water, wheat, woman). During each interview, the cards were laid out in front of the student (in the same order for each student) and the student was requested to 'arrange these cards in any way you wish, in a manner which makes sense to you'. The student was then requested to account for the arrangement. Care was taken to adhere to interviewing techniques consistent with warrants which allow one to move from data to conclusions in a defensible fashion (Lythcott & Duschl, 1990). Transcripts were produced *verbatim* from the tape recordings.

The construct conceptualisation was used in the analysis and interpretation of the interviews to reflect how students visualise, think about, understand, or make sense of experiences, phenomena, or particular relationships. As Marton (1988) notes, a conceptualisation is always the experience of something: in this study, students' conceptualisations of environment, and of human-environment relationships, were solicited (this construct is further discussed in Robertson, 1993). These categories are made distinct for analytic purposes only: they are not mutually exclusive in terms of an individual's understanding, and do not represent any one individual's understandings.

## **Outcomes**

First, four conceptualisations of environment are portrayed: 'Social', 'Political', 'Bio-Physical', and 'Inclusive'. Then, four conceptualisations of human-nature relationships, namely, 'Connected', 'Separate', 'Custodian/preservationist', and 'Wise-use' are described.

### *Conceptualisations of 'environment'*

(a) 'Social'. This category communicates a people-centred view of environment where environmental issues are conceptualised to be those which affect the circumstances of people in their daily lives, and where emphasis is placed on social interactions in a community setting. For

example,

*Alistair.* So, (in describing) a school programme in environmental education, you put: 'needs to prepare them for their community'. What view are you expressing here?

*Anne.* OK, most of the kids will go to a multiracial school, when they come back home, they don't mix with the community - even with the neighbours. They just become self-centred when they come home, they don't mix with the people. Why can't they make friends with the people? So this means, they don't know environmentally, they don't know what surrounds them, at home: they don't know what's happening.

Where reference was made to bio-physical features of environment, these features were raised in the interview when the student associated them with social needs. For example, while reminiscing on the Outward Bound excursion, Anne emphasised the social aspects of her experiences, such as the benefits she gained from having friends help her during her first rock-climbing and rapelling exercise. Little, if any, reference was made to any features of the natural environment in which the exercise took place. In the following excerpt, when questioned for the third time in the interview to describe 'an environmental problem in the country', Anne acknowledged her tendency to prioritise social issues:

*Anne.* I don't know what you mean by environment, because I have been expounding on an example, but maybe I am interpreting environment differently from what you expect?

*Alistair.* My interpretation of your view of environment is that it's community-based.

*Anne.* Yes, and one of the things that affect us environmentally is the water for the townships. Water, like, if, with my township, how can people live for two months with no water? With us, they (authorities) .. they just cut the water, and we live without water. You just have to go and get water, so I think water and electricity, these are an environmental problem for the community.

Social environmental problems associate closely with political issues, as indicated in this excerpt; there is much in common between a social conceptualisation of environment and the next category, a political conceptualisation.

(b) 'Political'. Beliefs and values which underwrite this conceptualisation include a concern for social justice, awareness of economic inequities and the politically disempowered status of the majority of people, and a rejection of structures and viewpoints seen to be associated with

'unrepresentative authorities' (such as the national government and local authorities). Vuli made numerous references to these elements during his interview. For example,

I think in our case, in the South African context, it's more complex, where you find there are people, a section of the population, who feel that they are excluded from decision-making. They are excluded from most things, so that whatever comes from the authorities, does bear a big question mark. Even the question of water, that we should use water sparingly, bears a big question mark. As long as it comes from the authority which they perceive as unrepresentative, they will have questions with it.

Another student, Siphso, repeatedly referred, either directly or indirectly, to the concept of 'basic needs' in relation to environmental awareness:

This whole question of environmental awareness goes hand in glove with the socio-political dispensation. Whilst you think you should be environmentally aware, there are other issues that sort of dictate against that ... like ... the question of needs. There are basic needs, like food, shelter, and clothing. In order to move up the hierarchy, you first have to satisfy those basic needs. Well, it's difficult to appreciate the nature when you are actually hungry, when you don't have shelter.

When asked to elaborate on past experiences which likely contributed to the development of these views, Siphso described how he used to obtain water from the single pump in his neighbourhood. During winter this pump often froze up, making access to water even more difficult. His references to basic needs align closely with his overall political (or, politicised?) conceptualisation of environment, and were described eloquently with respect to an educational setting:

It comes across nicely: a hungry child will never concentrate in the classroom. (...) If you look at it in another aspect, it's deliberate, given the kind of education that we are studying - the kind of education that Blacks are given - inferior education. The question of basic needs comes across nicely there. This sort of deficiency in our environments - they are sort of calculated to move consonantly with the kind of education - the inferior education that we get. We are not given food, so that we cannot concentrate, in school, so that we cannot achieve, in order to make food. Then it is the whole question of the cycle.

Another consequence of this people-centred but political conceptualisation was evident in Vuli's raising for discussion the Table Mountain (Cape Town) kaolin mining controversy, and questioning why this issue had received more prominence in the news media than the issue of the heavily polluted air of the eastern Transvaal coal mines. Whereas the former was an issue largely because of the mining operations' likely effects on plants and animals, the latter directly affects the health of people living near the mines:

So I was wondering, what is happening to the areas where we have the coal mining next to people? Has there been a cry as it has been for kaolin? (...) Now this is very complex, because of the South African situation. I mean, if we do have those double standards, I don't think we will be honest to try and address this whole thing. So if it affects a particular section of the population, then, (no-one listens), and if it affects a particular section, the whole country will cry.

Somewhat similar views were voiced by G. Mokae (Vice-President, Azanian People's Organisation): 'Now at the height of vogue, the green movement agitates on behalf of the flora and fauna of the entire animal kingdom (sic.) with but one exception: Black mankind' (Cock & Koch 1991, p.31). This criticism is elaborated in Guha's (1989, p.71) 'Third World critique of the trend in American environmentalism known as deep ecology', and is considered in the final section.

(c) 'Bio-Physical'. An individual espousing a bio-physical conceptualisation would tend to raise for discussion issues concerning natural systems and human impact on these, with an increased awareness of nonhuman life and the physical environment in general than might be the case from an individual espousing a social conceptualisation. In the case of the latter, issues concerning humans which arose from bio-physical or social environmental deterioration tended to be prioritised. As Grieg, Pike, and Selby (1989) comment, in an anthropocentric worldview, humans are seen as the principal actors on the planet, and nonhuman life and inorganic matter are accorded value only in terms of human priorities and needs. With a bio-centric perspective, on the other hand, humans are seen as but one element in the planet's system (Fox, 1990). The difference between focussing on, and being concerned about the effects of coal mining on people's health, as opposed to being concerned about the effects of kaolin mining on flora and fauna in the excerpt above illustrates a difference between these perspectives. A bio-physical conceptualisation may include views which, to varying degrees, are less people-centred, and perhaps are bio-centric, than views espoused by those espousing social and/or political conceptualisations. Consider how Johan, for example, described himself in relation to his university peers whom he considered as different in outlook:

Some of (my friends) would be interested in, like conserving wild areas, and other chaps just ... wouldn't care. All they'd care about is just ... people. (...) I think people are a big threat. I think man is our own biggest enemy.

The term bio-physical refers to living organisms, such as plants and animals (biotic 'components' of environment), as well as non-living features such as air, water, and mountains (abiotic physical components). While human-made constructions such as roads and factories are also physical structures, an individual with a bio-physical conceptualisation of environment tends to be aware of, and would place emphasis and value on, the natural elements, those which are not derived directly from human technology. Such awareness can include an historical perspective on human-influenced natural landscapes. For example, in describing his travels to and from Zimbabwe, Bill noted that

It's constantly in my mind that I'm on tarmac which is spread between here and Shamva, and that there's a border post, and a city, and a couple of large towns, and that there are too many people in the world and that they're are a kind of ... a blot on the place. That doesn't sound very humanist, I know, but the kind of urban situations that we've found ourselves creating (...) since the nineteenth century and the spread of colonialism, are creating a kind of ugly world to live in. (...) Maybe I've just been conditioned by a mother who believes in trees, out there, huge expanses of game reserve.

While social issues may be de-emphasised as a consequence of a focus on human impact on nonhuman components, this is not always the case. For Sara, heightened awareness of the bio-physical environment combines with 'humanist' values:

I'm very into animals, and nature as such, and I'd love to do something with that, on a permanent basis, and that's probably why I went into biology teaching, because it was a way that I could integrate the nature side of it with the helping people side of it.

Conceptualisations of 'nature' emerged during interviews where interviewees chose to speak about biophysical aspects of environment, for example, nature as pure and unadulterated by human impact. By contrast, human-manufactured objects were somehow tainted by association with their human origin:

*Kate.* I see beauty in the folds on a mountain range, and in the grain of a piece of wood.

*Alistair.* Why is it it more beautiful than this plastic?



*Kate.* That's manufactured, mass-produced. The influence of an extra shaft of light will have an influence on a sapling that will grow in a certain way because of that.(...) I suppose, it's part of the balance, whereas ... that piece of plastic is an amorphous blob. It's a polypeptide chain that we've developed. (...) it's just manipulated. I find I prefer writing in pencil, rather than pen.

(d) 'Inclusive'. Bear in mind that the conceptualisations described above were delimited for analytic purposes only, that the intention is not to represent any individual's views, and that the categories are not necessarily mutually exclusive in terms of any one person. Concerning the latter point, aspects of an inclusive conceptualisation of environment is exemplified in Ken's reference to elements of each of the above categories:

Education should make people aware of the world around them, and that world is not only soil erosion, animals dying off, whatever the case may be, but also what's happening in the ('black') township. They don't have any water today because it was cut-off by the authorities - that's environmental - essentially that is social awareness, what's happening. If you want to look at environment in terms of nature, you can't really separate that ... environment in terms of what people are doing, because the one affects the other. (...) Maybe also psychological: we live in a world where our environment also means people interacting with other people psychologically, and with themselves psychologically, with their own headspaces.

Finally, throughout the interview, one student cited numerous examples from his own experiences during the interview, consistently emphasising the importance of these experiences to an understanding of the topics under discussion. For Barry, vicarious experiences of the natural world (such as films or pictures in books), while enhancing his awareness, were insufficient experiences in and of themselves: he voiced a strong interest to experience, directly, some of these interests. For Barry, awareness alone is insufficient:

*Barry.* I've volunteered to be an instructor for one of these Hobbiton courses, where they take kids out - this is the type of person I am. I'm heavy into diving, so I always like to influence people to go diving. So I take (...) small groups to go snorkelling, hopefully, to influence them.

*Alistair.* Why do you want to influence them like that?

*Barry.* I don't know ... they should know about all of these things. (...) I think it makes life much more interesting. People only seem to be aware of the world around them - what they can see, and I think you need to take them and show them.

Throughout his interview, Barry emphasised the importance which he attached to the experiential basis underlying his understanding of different aspects of his surroundings: it is simply not enough to read about different plants, animals or places. Individuals may espouse degrees of interest in direct experience: this is not presented as a separate conceptualisation, but as an insight into beliefs and values underlying an approach to human-environment relationships.

*Conceptualisations of human-environment relationships*

This section presents a description and discussion of different ways in which these students conceptualised relationships of humans to living and non-living components. Four conceptualisations emerged (and were interpreted) from the transcripts: 'Connected', 'Separate' and 'Custodian/preservationist' with respect to other life-forms and the physical environment, and a 'Wise-use' conceptualisation of resource use.

(a) Conceptualisations of 'Connectedness', and 'Separateness'. In the first interview of this study, Ken provided an overview of human-nature relationships in broad terms, placing himself in the second of the two categories which he proposed. For Ken, there are

maybe two kinds of people: those who, when they see, or when they are in nature, feel a great deal of affinity with it, and those who for whom nature is just there. It's pretty, but it's not just something they would be particularly concerned to engage with.

The usefulness of a bi-polar characterisation of 'separate' and 'connected' is limited, and these views require further elaboration. Ken's description, nonetheless, relates to arguments in eco-philosophical literature. Evernden (1993), for example, contends that a sense of separation which individuals conceive to exist between themselves and bio-physical features of their environment is an adversary of appropriate environmental thought. One may refer to notions of connectedness from at least two different perspectives: 'science-based', for want of a better term, and 'psychologically-based' (Fox 1990). Some students espoused science-based conceptualisations of interrelations between themselves and physical aspects of their worlds, such as air and water. Others, on the other hand, alluded to a psychologically-based sense of connection of themselves with biotic and abiotic aspects of their environments. For example,

*Alistair.* So, you sense some sort of relationship between you and animals?

*Kate.* Absolutely ... everything ... physical. In a physical sense, Newton saw it: he saw that a particle had a relation to every other particle in the universe, just as my molecules do with that computer.

There's a physical relationship between them, just as there's maybe a psychological relationship between them as well. It might be in the form of a wave, something physical, or ... trying to link up ... I don't think I believed, ever, that things weren't related.

Kate's response to the card-sorting exercise, following some 10 seconds' of thought on the matter, was to scoop all of the cards together into a jumbled pile. By this action, she communicated her understanding that the various categories were interrelated, and her unwillingness to separate each category. These beliefs relate closely to conceptualisations which Devall (1988) considers to be a major theme of deep ecology: the wholeness and integrity of person/planet. Kate's action with these cards contrasted with other students who espoused varying degrees of separateness between humans and other living creatures, and abiotic features, and who structured the arrangement of cards in ways consistent with these views. For example, in the following excerpts Sara describes how she sees herself in relation to the animals she had raised for discussion:

(I see myself) as an intruder. I find it very frustrating that when I try to get close to (antelope), they run away - they're scared of me, and I've never actually done anything to harm them. As much as you try, it's very difficult: you're always just an outsider and, you represent humankind, and humankind is messing it all up.

Sara used a concept of 'merging' to explain how she attempts to diminish the separation which she feels exists between herself as a human being and other living creatures, regardless of her personal disposition. To Sara, 'merging' involves both physical and psychological aspects:

*Sara.* You, for yourself, are almost becoming a part of the environment. You're casting off human-type traits almost, and you're sort of naturalising. I suppose, you're coming closer to nature. (...) It's almost a conscious effort: you've got to sit there and wait for them to make the first move almost. You can't go to them: you've got to wait for them. Even on the farm, I used to go and lie down on the field. And if you just stand there, the cows just all go away, but if you lie down, they get inquisitive and they'll come up to you and start licking you.

*Alistair.* And have you actually done that?

*Sara.* Ya, Ya. They're very inquisitive. I love cows! Even with more or less tame animals, you have to first get their trust.

This excerpt reveals that Sara has devoted considerable thought to the relationship between herself and other animals, to the extent of having acted

in ways consistent with these thoughts. These conceptualisations also informed her views of promoting environmental awareness:

If you take the kids on hikes, then, you can teach them an awareness of nature. If you just bash on through a forest, you're not going to see anything, whereas, if you sit down in a forest, you're almost certain to see birds, and animals. You've got to make the effort, the animals aren't going to: they'll run if they hear you coming, so you've got to be quiet, and you've got to become part of their environment.

While discussing his arrangement of the cards, Barry explained the distance of each category with respect to the card 'Me' in terms consistent with his experiential interest: he arranged the cards in a roughly circular fashion around 'Me'. Similarly, while pondering his arrangement, Steven interpreted the extent to which his life experiences in an urban setting were quite separate, in the sense of physical location, from 'nature'. He also reflected on the manner in which this geographical separation contributed to the division between his experienced 'urban world' and the separate world of nature.

Conceptualisations of separateness in a sense other than physical location are evident in the following excerpt, where a 'socially-oriented' student discussed her arrangement of the cards:

*Anne.* I could have combined these together (man, woman, child) because they relate to each other, then I could have combined these together, because they are animals.

*Alistair.* Which are quite separate?

*Anne.* Yes, they are quite separate, then I could have related 'road', 'tree', 'mountain', 'river' together.

*Alistair.* Why do these relate together?

*Anne.* They are a part of the environment, then these are the things that we need in order to live, then those are animals, part of the environment, things that we need, and that's what each home comprises.

This excerpt portrays elements of an anthropocentric and social conceptualisation of environment as separate from humans. At the same time, there is clear recognition of numerous (science-based) relationships between components of the natural/bio-physical environment and human needs. The conceptualisation is anthropocentric in that these relationships are viewed *in terms of* human needs. And, in Vuli's case, where one's basic needs are not satisfied, issues concerning this separate 'natural world', which do not directly affect humans, are understood to be of little significance:

I think the society that one lives in does have an effect as far as one

behaves in the environment, and to be quite frank, in our own 'black' society, if I may distinguish, we don't really bother ourselves about the environment. (...) I'm referring to the forests - natural environment ... because there are a lot of arguments where people would say 'What is the use of nature, why do we need to appreciate nature?'

Confronting the 'stereotype that blacks have no deep regard for the appreciation .. of natural resources', Magi (1989, p.334) considers the impact of apartheid policies on 'black people's perception of natural recreation resources' (p.337). While such claims for generalisability gloss over 'within-group' differences and social realities of people in different contexts, they serve to remind one of associations between political practices and individuals' perceptions. Bear in mind that it is only within the decade that South African 'blacks' have been legally permitted to enter most conserved areas (national parks and game reserves). Further, the question has been raised as to whether these statutory limitations on access have been replaced by economic limitations, a 'form of economic apartheid' (Irwin 1991, p.6).

(b) A 'Custodian/preservationist' perspective. Raised on a farm, with a strong interest in the natural world evidenced in experiences such as guiding tourists in remote areas, Johan espoused a bio-physical conceptualisation of environment. Further, he considered his role in the relationship between himself and animals, including 'primitive' humans, to be that of a custodian, or preservationist. This role was articulated, for example, during a description of his arrangement of cards:

*Alistair.* How are you connected to 'elephant', 'insect'?

*Johan.* The only way I'm connected to them is basically just trying to preserve, watch over.(...) There are enough people growing wheat, making roads, babies, that type of thing, but there are not enough taking care of these chaps (pointing to 'elephant'), who can't take care against us.

Views consistent with the notion of a preservationist role emerged in Johan's description of a discussion he initiated with pupils during his teaching practicum at a local 'white' school:

*Johan.* The people living in the (Kaokoveld) reserve, the Himbas, they've been there for millions and millions of years: they're still like Bronze Age people. We stopped and I thought: I've got to give these guys something, so I gave them a potato, and this guy just started eating it raw. He didn't even know what a potato was, or things like that - you know, still primitive. They're so much part of the landscape. So I was asking (the pupils, in class): 'What do you think

should happen? Should this be camped off as a reserve, and the people re-located, or should people stay there?' I was asking them what their ideas were, and obviously you got ideas varying from 'You should shoot a few' to ...

*Alistair.* Shoot a few ...?

*Johan.* People, you know.

*Alistair.* Who was advocating this? The kids?

*Johan.* Ya. No, No, just their answers, you know.

*Alistair.* Why would they suggest to 'shoot a few'?

*Johan.* Well, basically just ... like if you're going to camp it off, just to keep the numbers down. But then, we'd discuss it. 'This is serious', 'Why are you thinking like this?', 'How can you do that?'

The above excerpt contains inflammatory statements which must be considered in the South African context of forced removals of disenfranchised people, a policy which was widely implemented during the apartheid years and, in relation to this case, during the construction of some 'national' parks (*Weekly Mail*, 30th October 1992, p.14). The legacies of these removals, and associated demands for recompensation is a highly sensitive issue in the current political situation. The ('white') pupils' suggestions are included in this excerpt, in an attempt to communicate how these perspectives, while outrageous in terms of social justice, are consistent with the notion that in order to conserve reserves, management is required. Johan's response to my probe 'why would they suggest shooting?' is to refer to the rationale for standard game-management procedures adopted in most southern African reserves, and *apply it to humans*. While he goes on to indicate the problematic nature of these suggestions, which he seriously encouraged the pupils to re-consider, these statements are included here to communicate preservationist beliefs that humans must protect 'parts of the natural landscape', such as game reserves, even if such protection necessitates management practices which may have extreme social consequences. That such perspectives are given credibility as the subject of debate in classrooms is indicative of socio-political values which have long characterised 'white' South African society. If one is able to consider these views in isolation from racist values, however, Johan's comments indicate an anthropocentric perspective in association with a bio-physical conceptualisation. Showing a keen interest in the natural environment, he sees his role, and that of other concerned environmentalists, to be one of custodian over and preservationist of the nonhuman world.

(c) Underlying a 'Wise-use' conceptualisation is the recognition that unrestrained resource extraction may lead to depletion in the long-term, and that human interests are best served by acknowledging the necessity for restraint. For example,

*Alistair.* You wrote 'stress the kind of relationship that should be fostered': what kind, do you think?

*Vuli.* To conserve the environment. As much as we benefit, but I think we need to do things that we don't regret at the end of the day ... that whatever we do to the environment, it should not hit back to us in the long run ... I think that's what I had in mind.

Vuli went on to indicate how his teaching practice would communicate utilitarian views of human-environment relationships:

If I start with the simplest example of a tree. So what do we get from a tree? We get wood, so what if we cut all these trees down? We get the excess of wood, money. So what would happen at the end of the day? This long term view is how I would introduce it, with these simple examples, like grass and grazing.

## Discussion

### *Students' beliefs and environmental education*

With the exception of the Outward Bound excursion (education through the environment), these students had not experienced any environmental education-related interventions at the time of the interviews. And, while a United Nations environmental education newsletter advises university teachers to 'assume virtual environmental ignorance' on the part of such students (Unesco-UNEP 1991, p.2), evidence presented here suggests that this claim is not justified. This dissonance could perhaps be expected, given incongruencies between the theoretical underpinnings of this study and those of the currently dominant applied science approach to environmental education. The recommendation about assuming virtual environmental ignorance is consistent with the latter's information-oriented approach (Robottom, 1991) to a greater extent than the present study. Thus, students may espouse a range of beliefs on human-environment relationships, as well as a range of conceptualisations of 'environment' itself. That these students struggled to articulate their beliefs, and even that certain beliefs may be judged to be unsophisticated, is another matter. After all, in the past they had rarely, if ever, been asked to make explicit their knowledge of ways in which they conceptualise human-environment relationships. This is hardly unexpected, given the virtual absence of inquiry into such relationships and the pervasive emphasis on disciplinary knowledge in educational curricula (Gough, 1989; Orr, 1992). As Gough (1989, p.228) observes,

learners' own perceptions of their environment are often disregarded by teachers, who see such perceptions as distractions from the transmission of socially-validated knowledge.

Gough's criticism is entirely consistent with a constructivist perspective on knowledge and learning (Robertson, 1993). While environmental educators advocate the 'commitment to act on one's values' (Stevenson 1987, p.73), there is little published research on *how* students conceptualise their beliefs concerning environment (although see Wals, 1992). In some institutions, personal analyses are a component of environmental education programmes (Fien 1993, p.ix). Such efforts at personal clarification, as a first step, are essential; after all, in most educational settings, teachers and learners can only deal with what is explicit.

Thus, in teaching-learning situations, students will be exposed to differing perspectives and the sense they make of these depends, in part, on their prior beliefs. In educational terms, the issue is not whether students are ignorant, but the extent to which they are aware of their own beliefs, and hence able either to further develop and elaborate upon them, or to consider them in relation to possible alternatives. A discussion of three aspects associated with this contention follows.

First, this study indicates that students' untutored conceptualisations are situated at various points in relation to an anthropocentric-ecocentric distinction. From an eco-philosophical perspective, environmentalists propose a fundamental reorientation, away from anthropocentrism and toward an ecocentric way of being in the world (Devall, 1988; Devall & Sessions, 1985; Evernden, 1993; Fox, 1990). However, Guha (1989) argues that this dichotomy is less relevant when applied to Third World situations, because it has no connection to two fundamental ecological problems of overconsumption and growing militarisation. In many respects South Africa exemplifies global 'First World - Third World', or 'North-South', dichotomies (Hallowes, 1993). In this context, then, the promotion of particular eco-philosophical conceptions, especially those derived in markedly different social situations of Europe and North America, may well be inappropriate. In order to promote environmental literacy in pre-service teachers, I claim that it is defensible (*q.v.*, Jickling, 1992; 1991) to engage students in critical analysis of their beliefs in relation to perspectives in the literature and in terms of their social context.

Second, a benefit of making one's conceptualisations explicit is the claim that this process enhances one's ability to make sensible changes (Marton, 1988). Implicit in this claim is an understanding of learning as conceptual change (Robertson, 1993). A third point, in summary, concerns the extent to which teachers are able to understand, with empathy, differing viewpoints espoused by their students. Only through encouraging students to make explicit their beliefs can such mutual understanding be promoted, and critical examination of these beliefs be engaged.

*Teacher education and the evolution of environmental education*

While students espoused diverse meanings for the term 'environment', some



associated it with 'nature' and 'conservation'. Historically, this has been the case in South Africa and in other countries (Irwin, 1990; Loubser & Ferreira, 1992). However, social and political changes which have infused South African society since February 1990 have encouraged environmental educators in the region to re-conceptualise their practice (Ashwell, 1992). *In Going Green: People, Politics and the Environment in South Africa*, for example, Cock and Koch (1991) describe and analyse numerous connections between environmental degradation and political practices underlying social inequalities. The shift from a focus on bio-physical surroundings toward a more inclusive conception which encompasses social, political, and bio-physical features has implications for the practice of incorporating environmental perspectives within teacher education. For example, students espousing a political conceptualisation of environment will find a degree of congruence between their views and an environmentally-oriented curriculum. Sessions (1991, p.114) however, questions what the outcome will be as the 'social justice movement (with its anthropocentric lineage) attempts to join forces with the eco-centric ecological movement', and goes on to argue for the former path. Given the massive social discrepancies in South Africa, this option is problematic, at best, and Guha (1989) elaborates on reasons why such an option would likely serve the interests of a privileged minority rather than those of the economically-impooverished majority.

In educational terms, then, a programme curriculum embodying an inclusive conception of environment should take into account students' beliefs. Only through this process can teaching practice acknowledge, and be more respectful of, learners' existing knowledge and the diverse cultural realities which increasingly characterise classrooms, rather than promote particular conceptions or pre-defined behavioural goals. Thus, if professional development in environmental education is to encourage participants to adopt a research stance towards their own beliefs and practices (Robottom, 1987), then encouraging and assisting participants to make explicit their beliefs is a necessary first step in this process. Interpretive research can be done by students and teachers working together, with the goal of increasing both mutual and self-understanding in relation to their social milieux. Given South Africa's recent history of legally-enforced social separation, pedagogical practices in increasingly multicultural settings which promote mutual understandings are surely worthy of attention. Research can contribute to contextually appropriate practices to facilitate this process.

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