STUDENT TEACHERS' CONCEPTUALISATIONS OF 'SIGNIFICANT' ANIMALS

THESIS

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CONTENTS

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ABSTRACT

Constructivist approaches to teaching and learning are a well established component of the landscape of educational research, especially in Science education. This research took as its starting point the limited amount of social constructivist research available in the field of Environmental Education and responded to calls for further research.

The research was designed within an interpretive tradition, as a critically phenomenological enquiry employing two methods; single case studies and a focus group. Data collection used progressively focused interview questions to proceed through a series of individual interview stages, starting with a simple description of conceptualisations and moving to deeper analysis of influences on, and use of conceptualisations. The focus group was designed as a forum to explore the pedagogic issues connected to the `social negotiation of learning', based on data and insights gained from earlier interview stages.

The goals of the study were to record data on *the conceptualisations of animals perceived as significant by a group of Tsonga speaking students*, and to *seek insights into the formative influences on those conceptualisations.*

The research question, namely ***what contribution can social constructivist approaches to teaching and learning make to Environmental Education?*** guided an interpretation of the above

data in terms of a range of social constructivist theories of learning.

Theories of Radical and Social Constructivism as applied in Science education, although dominant orientations for educational research in constructivist learning, were challenged and found inappropriate as a basis to inform methodologies for Environmental Education.

Instead Lave's (cited in O'Loughlin, 1992) socio-cultural approach to learning was explored as the basis to create a more useful perspective on an environmental education situation

Finally it was concluded that Lave's socio-cultural approach to learning may be a useful guide to helping a teacher elicit the full range of conceptualisations present in an environmental education situation, but is not ultimately effective if no challenge and change comes about. Consequently, a socially critical constructivist teaching and learning approach was suggested.

In conclusion I commented on the interpretive research methodology employed and suggested an example of a socially critical methodology that could take this investigation further.

CHAPTER ONE: INTRODUCTION

Contextualising the Study

There is a region of South Africa that stretches northwards to the Limpopo border, defined to the West and South by the Drakensberg escarpment and to the East by a lowveldt dominated by game ranches and parks.

Much of the economy of this region, is concerned with tourism. The images displayed in glossy brochures, tend to stress a construct of 'Africa' as ancient, noble and pristine. Large areas of land have been reconstructed as game parks to ensure the survival of natural ecosystems which contain the flora, fauna and scenic beauty so essential to the tourist experience of 'Africa'.

There is another sense in which the experience of 'Africa' is constructed. A particular interpretation of the region's culture and history is nurtured. For example a romantic 'Africa' may be offered to tourists through a visit to a reconstructed ethnic village, the retelling of colonial frontier tales, or a visit to a preserved goldrush town where tourists can soak up the atmosphere and buy ethnic mementos.

On the other hand there are many who have good cause to conceptualise their African reality differently. The creation of game parks and other 'removals' under the apartheid Group Areas Act, meant for Black South Africans, the large scale dispossession of their land and relocation into 'homelands'. To the north of this region this is evident in the physical, political and cultural construct, which is the ex-Homeland of Gazankulu.

In the broadest sense this study is contextualised in Gazankulu and in the historical experiences of its Tsonga people. All but one of the students and teachers interviewed were Tsonga speakers, their conceptualisations, elicited by the study, were constructed in a cultural milieu that is in some respects rural and traditional. But Gazankulu is an area in transition, many of its public institutions are western-designed, its workforce migrates to the metropolis and its schooling is interpreted as facilitating upward urban mobility.

As a foreign resident working at the College of Education in Giyani, the 'capital' of Gazankulu, I found it difficult to know my students conceptualisations of their reality in anything but a superficial way. But then I imagine they found it difficult to know mine. This had particular relevance in two areas of concern to me as an educator: communication with my students about environmental issues; and innovating new, interactive teaching methodologies. The context of these concerns is developed below.

There is a mountain Man'ombe, at the edge of Giyani College. The mountain's inhabitants were forcibly removed under the Group Areas Act so that it could be reconstructed as a nature reserve. There is a small plateau near its summit with hut foundations and burial mounds to remind the visitor that this place was once conceptualised as something different. The view from here is elevated and sublime, it feels as if with one sweep of the eye all of Africa can be consumed. Thick walls of Buffalo Thorn trees cut off the view of urban development below.

I often climbed up to that place to be at one with nature with feelings of gratitude that all this was possible. I knew there would be no deforestation on Man'ombe, no goats, no soil erosion and I knew the Kudu would be sharing it with me. I also knew that no human would disturb me, yet that also seemed a great pity!

Not 200 metres away were the red roofs of the college, the sounds of music and voices would drift up to me. Down there were my students, probably throwing fast food containers out of their windows. They never came onto Man'ombe, even the ones who I worked with in the Conservation Club. I wondered why they did not appreciate the rich resource of history and nature on their doorstep? Actually I knew that many students were afraid of this place, the spirits and the snakes. But these students are going to be teachers I thought. What hope was there to educate a new generation about the environment?

I was a lecturer of General Teaching Methodology with ideas of showing my students new ways of interacting in the classroom to replace the traditional transmissive methods they have grown used to in there own journey through schooling. I was supported in this by an innovative college management.

I put much effort into stimulating my students; by changing the classroom layout for group work and face to face discussion, by not teaching from chalk board or text book, by working from students' own experiences of education. I assured them that what counts for course assessment is not their memorisation of facts but their genuine engagement with the concepts that come up for discussion. I told them that I wished to assess their own ideas, but their assignments were regurgitations of course notes. It seemed to me that what most of these students wanted to do was pass with the minimum of mental disturbance. Having seen them in Teaching Practice it was clear that few actually wished or were able to change their teaching methods from the ones they were socialised into. Why I thought, were they so resistant? What was I doing wrong?

This Study

This is a personal journey contextualised in the descriptions above which have helped to frame the research goals and question. In essence the study is about recognising the constructedness of peoples' understandings of their worlds and how to work from, and with, these constructions in an

environmental education situation.

CHAPTER TWO: VANTAGE POINTS

This contains a description of the 'research goals' and 'question' arising from an exploration of some significant, personal educational experiences. A review of literature is used to gain 'vantage points' from which to understand and guide subsequent research activity. The core concepts explored are 'conceptualisations', and 'constructivist' approaches to eliciting and addressing such conceptualisations in a learning situation, specifically in Environmental Education.

CHAPTER THREE: METHODOLOGY

This section justifies and describes an 'interpretive' research methodology for the data gathering and interpretation.

CHAPTER FOUR: RESULTS

Here the results of 'three stages of interviews' and a 'focus group' are summarised and 'key findings' generated.

CHAPTER FIVE: DISCUSSION

In this chapter key findings from the first three stages of interviews are brought to bear on the research goals and research question. Insights derived from this process are related to theoretical vantage points and further findings from the focus group.

The discussion challenges the appropriateness for Environmental Education of Radical and Social Constructivist approaches as applied in Science education, and which currently dominate orientations for educational research in constructivist learning.

In the light of these challenges Lave's (1988) socio-cultural approach to learning has been explored as the basis to create a more useful perspective on an environmental education situation.

Finally it is argued that Lave's socio-cultural approach to learning may be a useful guide to helping a teacher elicit the full range of conceptualisations present in an environmental education situation, but is not ultimately effective if no challenge and change comes about. Consequently, a socially critical constructivist teaching and learning approach is suggested.

CHAPTER SIX: CONCLUSIONS

This concludes the thesis with a summary of what I have learned, through the research journey, about students' conceptualisations and the implications for teaching methodologies in Environmental Education, from a particular social constructivist vantage point.

CHAPTER TWO: VANTAGE POINTS

ESTABLISHING A RESEARCH QUESTION

The research question grew out of a position I had come to as a teacher that effective learning takes place when concepts are negotiated in terms of mental 'pictures'. Teaching in terms of pictures became for me both change in emphasis from abstract to concrete and a feeling that knowledge is a pattern of complex, interlinked images, unique to the individual learner. Schools were the point where the teacher's images of things and the learner's met. Teaching needed to bring these images into the open. Effective learning was modifying one set of images in terms of the other.

From my experience at the college however, I found modifying my students' ideas on environmental issues problematic. Their ideas seemed entrenched, their images inaccessible. They did not show a lot of interest in my images of things. These were both the circumstances of and motivation for refining my research question and designing the data collection.

The puzzling nature of these observations prompted discussions with colleagues. Explanations were offered of the students' conditioned passivity; their definition of 'useful knowledge' as that which is in the Examination, a view supported in the

literature (Vulliamy 1987). But it was my participation with a group of local teachers in an environmental course at a National Parks Board centre that proved most significant in shaping the research question.

We sat through a lecture by the education officer who propounded views about conservation and the importance from an ecological perspective, of certain animals. Later the teachers were laughing about what the education officer had said, they could 'see the sense' in his views but could not accept them. What seemed to be happening was a conflict of views of reality. The teachers' construction of reality was based on aspects of their culture (Winter & Reddy 1996:26). The education officer held a 'constructed' reality influenced by a Parks Board culture, that was communicated by what he said, how he said it and even what he was wearing. It seemed to me that we could only begin to meet the learning objectives of the environmental course if there was some 'coming together' of these different constructions. This in turn would conceivably require both teacher and learners to become mutually aware of their different socially constructed views.

The research question became:

> 'what contribution can social constructivist approaches (to teaching and learning) make to Environmental Education?'

Support for the value of asking this question comes from several areas. The first is a generally felt need to transform South African education away from widespread 'outmoded teaching practices' (RDP 1994), characterised by rote learning, and transmissive teaching towards behavioural objectives.

Additional motivation for the research question came from Robertson's (1993) plea for more constructivist research in Environmental Education, to 'enhance mutual understandings' in learning situations.

Thirdly, and resonant with Robertson's plea, the research question is further justified by a public call for educational change in the form of the EEPI (1993:5) document which called for efforts to enhance the learning process in Environmental Education through practices that help learners 'mobilise their existing understandings' of the topic under consideration.

Although influential in current educational research, constructivism is contested (Solomon 1995), and the study must now be informed by an evaluation of a range of theoretical contributions to the field.

CONSTRUCTIVISM AND SOCIAL CONSTRUCTIVISM.

Taken at face value, concerns with learners' understandings, or conceptualisations,[1] rest on established constructivist approaches

[1] The terms 'understandings' and 'conceptualisations' are used interchangeably,

(Ausubel 1968; Klein & Merritt 1994). However not all constructivist approaches recognise the 'social' nature of learning, a point made by Solomon (1995) who suggested that the construction of understandings is a social process of sharing meanings with others through the operation of 'intersubjectivity' defined as:

> A process of interchange, a dynamic during which 'meanings' are chosen from a repertoire of 'language tools' into which the speaker/ hearer have been socialised (Solomon 1995:15) [my emphasis].

Resonant with Solomon's emphasis on meaning-making and language, in processes of social construction of understandings, the EEPI (1993:5) document suggested that learning:

> is characterised by an open and interactive process (dialogue-encounter-reflection) involving both teachers and learners within a holistic, political, social, economic and bio-physical context.

The aim of this review of constructivism is to develop a vantage point on the research question by drawing from social constructivist learning theory. So far social constructivism has been suggested as an interactive process concerned with learners developing meanings through dialogue. Di Chiro's (1987:24)

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since they both refer to learners' meanings, attitudes and values attached to a

suggestion seems to provide support for this notion:

> We define [the environment] by use of our individually and culturally imposed interpretive categories, and it exists as the environment the moment we name it and imbue it with meaning.

However meaning-making is subject to different interpretations. The Habermasian theory of the social organisation of knowledge is useful at this point since it suggests there are different ways of 'coming to know' linked to various knowledge constituent interests. Knowledge developed as constructions i.e. understandings growing through an interpretive process of meaning-making, is seen to arise from two different interests; 'practical' or 'emancipatory' (Huckle 1993:45; Dunne & Johnstone 1992:516). Explanation of how these two interests manifest in social action (Popkewitz 1984:35; NOTES A) gives insight into what social construction might involve in a learning situation.

A social constructivist pedagogy informed by a practical interest would see interpretive processes of meaning-making influenced by learners' and teachers' cultural context and intersubjective exchanges. Support for this view of learning can be found within: Environmental Education locally, (Naidoo et al, 1990:14); Science Education internationally (Osborne 1993:1); South African Science and Technology Education (NOTES B); a Socio-cultural perspective on

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particular concept (Robertson 1994a).

learning (Berger & Luckman 1973; O'Loughlin 1992); Multicultural Education (Hodson 1993:695); African Science Education (Jegede & Okebukola 1989, 1993; Ogunniyi 1995), and the growing emphasis on Indigenous Knowledge in Environmental Education (O'Donoghue 1994a).

On the other hand a social constructivist, emancipatory pedagogy would seek, over and above meaning-making, a critical analysis of the social and political contexts which circumscribe the production and validation (social negotiation) of knowledge. Goodman (1992:121) asserted the necessity of a critical view of how individuals' constructions are influenced by their social interactions:

> To dwell on an actor's subjective consciousness may conceal the extent to which [it] is regulated by underlying structures and social relationships ... why [are] certain institutionalised meanings rather than others dominant within a given milieu?

Addressing the problems of researching conceptualisations of gender Dunne & Johnstone (1992:519) took a similar critical position:

> There is an apparent contradiction within the position which overtly proclaims the social production of knowledge but leaves unquestioned the power relations that circumscribe the way it is organised.

Further support for an emancipatory pedagogy of social change or 'critical social construction' is found in Robertson (1994a:22); Wals (1992:45); Robottom & Hart (1993); Fien (1993b:7); Gough (1990:238); and Huckle (1991, 1995).

In South Africa, support for this latter perspective is growing (O'Donoghue & Janse van Rensburg 1995:11). A reconceptualised pedagogy of Environmental Education formulated by O'Donoghue (1993) that involved 'interactive classroom and community orientations' involving 'reflexive social processes of change', that could 'accommodate the realities of how people come to socially construct and to change the way they see the world'. In essence O'Donoghue's (1993) formulation resonated with Fien's (1993a) approach to Environmental Education in which social construction is 'construction and reconstruction of social reality' through a process of 'critical reflection'. (NOTES C).

Differences of opinion on how processes of social construction occur have been alluded to. Should these processes be regarded interpretively or critically? Should there be considerations of institutional influences such as power relationships and economic structures?[2]

Gaining greater clarity on these perspectives from existing constructivist environmental education research is problematic, both because of scarcity (Robertson:1994a:1) and the limited scope

[2] This issue will resurface in the discussion of results, Chapter 5].

of available studies. Wals' (1992) and Robertson's (1993) interpretive studies both conclude with calls for environmental educators to gain a greater understanding of the perceptions of environment their students bring to a learning situation. While both studies focus on eliciting and describing participants' conceptualisations of environmental issues, however, neither seek to illuminate the influences on the generation of those conceptualisations.

Against this background this review will seek further insights on influences on conceptualisation and social construction in learning situations by considering:

- The researcher's personal teaching experience.

- The literature on multi-cultural science education.

- Theoretical propositions from educational philosophy and psychology on how learning as social construction occurs.

EXPLORING PERSPECTIVES FROM PERSONAL EXPERIENCE.

The value of engaging the researcher's own experiences and biases as part of interpretive research has been argued by Goodman (1992); Wals (1991) and Robertson (1994b). Therefore it may be useful to expand here on my introductory comments on my experience as a methodology teacher in a South African college of education where I

was concerned to innovate interactive, student centred pedagogy. This innovation of teaching and learning methodology was set against the students' didactic background in which the teaching they received was reduced to transmission; their learning to absorption of facts; and their evaluation to normative assessment. Generally students had been socialised as passive learners through 12 years of 'banking' education (Freire 1974).

As a group, my students showed a clear preference for a top-down style of classroom communication in which they listened while I imparted information; they performed assessments and waited while I pronounced judgement. The interactive pedagogy I sought to innovate aimed at a modification of this relationship in which students would express their own understandings of the topic under discussion and not rely entirely on my own. However, there was considerable resistance amongst students to such a change, a phenomenon which I had also observed amongst local school children. I had attributed their reaction to the power inequalities of the traditional, authoritarian teaching they were experiencing. Consequently I began to see my 'student passivity' as: active resistance (Lather 1986); less a culture of silence than a silence about culture (Freire 1974:1-59); a group impenetrability that acted as a protective mechanism against my demands for active student participation. Secondly, while I was given all apparent deference during lectures, little significance was given to my opinions outside those relating to my role as arbiter of the 'diploma paper chase'.

After discussing these conclusions with a similarly concerned colleague, I was invited to observe his teaching of a Biology Genetics module. Here I observed the transmission of a scientific explanation of species diversity, as a product of a chance-driven, evolutionary process. Evaluation of the course was through examination of taught concepts. Although results were 'successful' in those terms, my subsequent informal discussions with students produced three interesting insights:

Firstly, students revealed they were holding at least two understandings of the topic: one that was a function of a culture of 'scientific explanation', transmissive teaching and examination requirements; the other a function of 'traditional or religious explanations' of the origins of species. The latter explanations were held by many students to be more valuable since they derived from communal consensus. Secondly, the emphasis on producing and validating knowledge through individualised, book-led learning processes conflicted to some degree with students' social tradition where 'coming to know has a communal and consensual character'. Thirdly, although there must have been considerable cause for students to doubt the scientific version of genetic evolution, in order to pass the assessment, they 'acquiesced to the teacher's authority'.

These observations draw attention to unequal power relations which may be explored further in terms of world views present in the classroom. A key analytical concept for the validation of science

claims are 'warrants, devices which authorise moving from data to conclusions and theories (Russell & Mumby 1989) or 'knowledge claims' (Robertson 1994b). The teacher warranted his assertion that evolution is determined by genetic behaviour, on the authority of scientific evidence. However direct empirical evidence was unavailable in the college classroom, so it was substituted by text book abstractions. Teacher talk was aimed at bringing learners to an acceptance of the teacher's theories, yet his claim for a 'chemical basis' to evolution, like religious explanations of 'creation', required the same suspension of disbelief or blind faith, a point made by Ogunniyi (1995).

In the context of school science in Africa, Ogunniyi (1995) pointed to the co-existence of world views, arising from Western science and African tradition. Within a Western Scientific world view, efforts are directed at constructing a universal, monistic 'truth' of reality as the natural world operating like a machine according to laws of matter in motion. Theories of philosophy and history of science show the Western scientific world view as evolutionary, arbitrary and not alone as a system of explaining reality. Khun (1970) has commented on the fallibility of the empirical analytical method, but Ogunniyi (1995) pointed to the absence in school science textbooks of any such doubts.

EXPLORING THE NOTION OF WORLD VIEWS IN MULTI-CULTURAL CONTEXTS

A key concept in culturally oriented constructivist education is 'world views' (Lynch & Jones 1995; Watts & Bentley 1994). Explicit

concern with world views in multi-cultural settings also features strongly in multicultural science education (Hodson 1993:695; Pomeroy 1994:63; Krugly-Smolska 1995:49), and writings on African students' conceptualisations of science (Tema 1989; Jegede 1991, 1994, 1995; Jegede & Okebukola 1993; Ogunniyi 1995).

The concept of world views provides a link between culture, community and learning, thus Ogunniyi (1995:5) defined world views as:

> ...a cultural framework held by a group of people about the basic nature of reality that determines the success or otherwise in which a new concept will be integrated with pre-existing knowledge.

This idea of world views can be seen at work in the African science classroom, in terms of Western science and African tradition. Within a Western scientific world view, a Cartesian separation between people and environment applies. Knowledge of the impersonal physical world, operating like a machine according to laws of matter in motion, is discovered by the unique rational activity of the human mind, which is concerned to know how rather than why, phenomena occur (Ogunniyi 1995:5).

On the other hand, traditional African worldviews do not hold humans as separate to the physical world, Ogunniyi (1995:6) suggested "to the African the world is full of life ... he

cultivates a humanistic relationship with everything found in his environment". The world is not mechanistic but its functioning is understood in anthropomorphic terms. Phenomena and events do not simply occur, they are caused. Causalities can be understood by cosmologies that unite man, resources, ancestors, gods, supernatural and natural forces. Knowledge is not discoverable, it simply exists as "pragmatic, unequivocal, non-testable and non-falsifiable.

To Ogunniyi (1995:5) "one's world view has an organizing value for experience", i.e. the integration of new concepts with pre-existing knowledge, is determined by the "framework ... of one's world view". With Ogunniyi it is suggested that world views are influential on the development of learners' understandings. This idea will now be pursued with reference to theories of learning as social construction.

EXPLORING THEORIES OF LEARNING AS SOCIAL CONSTRUCTION

Caution is necessary when reviewing the literature on social constructivism, since it is not a unified theory of learning but an arena of competing theories engaging social aspects of learning in different ways.

Constructivist approaches in the neo-Piagetian tradition currently dominant in science education research (Lerman 1989) do embrace social aspects of learning through cross-linguistic studies and studies of the whole classroom environment, but are mainly

concerned to describe, or redescribe the 'what' of learners' understandings (Solomon 1992:16). By contrast, Solomon (1992:16) challenged social constructivist research to seek to describe 'how' such understandings are socially generated. How do we explain she asked, "the process of learning as struggling with conversation in an unknown language, or of learning as arrival on a foreign shore?"

Solomon's metaphors of 'unknown languages' and 'foreign shores' evoke a sense of the difficulties that may arise in multi-cultural contexts, as raised by Winter & Reddy (1996:26), and Ogunniyi's (1995) observation of contrasting and separate world views operating in African science lessons, similar to those observed in the teaching of the Biology module on evolution.

Rowland's formulation of good educational practice (cited in Robertson 1994b) is presented here as an example of how a pedagogy that is attentive to the influences on the generation of learners' conceptualisations, may respond to the difficulties that Solomon has noted above.

> At the heart of any good teaching and learning experience is a critical relationship ... in which teachers and learners alike seek to question each other's ideas, to reinterpret them, adapt them and even to reject them, but not to discount them. To be critical in this sense, we need to know something of those ideas, their roots, the frameworks in which they are embedded.

Rowland's statement returns this exploration to the notion that the influences on the generation of learners' conceptualisations are embedded in the cultural frameworks of both teachers and learners. But how do social constructivist theorists explain how 'coming to know' is embedded in social experience? This search may best begin with Gergen's (1995) observation that practices in education proceed from assumptions about what constitutes knowledge (epistemologies).

Dualist epistemologies of mind and world as separate have historically dominated theory on the development of knowledge (Shotter 1995:43). Firstly the 'exogenic' view that 'mind' is an accurate representation of the existing states of the external world. In this view, knowledge is objective and universal, an externality to be gained but not created by the mind. Learning is concerned with knowledge as measurable product, 'a change in behaviour along pre-specified objectives' (Gowin 1981). Transmissive education embodies this perspective and defines the teacher's role as a conduit of authorised, objective knowledge.

Secondly the 'endogenic' view maintains this dualism, but in reverse, that is knowledge of the world is now viewed as a construction of the mind. However it is significant that learning continues to be seen as a product of individual rational cognition (NOTES D).

Rowland's statement characterises a form of learning that dispenses with dualism and individualism. In his view of knowledge it is neither generated through an exogenic nor endogenic model, but through a 'collective construction' and reconstruction of meaning; through minds acting in a social and cultural context. Shotter (1995:45) argued that in this case the emphasis is on 'mind as social'. The basis for his assertion is that coming to know the world necessarily involves a 'system of representation' as 'language', and language is an evolving production of minds acting socially through history and within various cultural milieux.

In recognition of the role of language in learning, Gergen (1995) proposed that what one 'knows' as an individual becomes meaningful through social 'dialogue', when it is assented to by others through language. Meaning is further generated by language, since it is part of our 'socio-cultural' and 'communal' circumstances.

Ernest's (1992a) contribution to the above theory of learning; mind as social, language and culture, provides support and a useful summary. Knowledge of the world is constructed, validated and reconstructed in a context of 'social interaction'. Mind as construing subject, should be understood as 'persons in conversation in culture', since what constitutes 'interaction' is centrally dependent on 'language' and what constitutes 'social' is contingent on 'history and culture'. Ernest referred to the 'social negotiation of meaning' to describe the sense of a contingent, shifting character of 'knowledge generated by communicative',

'intersubjective', 'context dependent', 'socio-cultural processes'.

If learning is socially situated, intersubjective communication, then Schutz's notion of 'lifeworld' (Schutz 1973), (as the stock of knowledge and perspectives a person uses as a template for intersubjective communication, action and sharing) goes some way to explain a mechanism of social dialogue (NOTES E).

Lifeworld has an unproblematic, everyday and routinized character. However much of the vast production of human meaning-making ceases to be seen as lifeworld, since it becomes institutionalised as 'objective reality' outside of lifeworld.

Language is the principal medium of the continuous exchange between people's lifeworld and their objective reality. This exchange process occurs through 'reciprocal interaction' with other people who are part of one's objective reality and yet closely linked to one's lifeworld. They may be intimate 'significant others', friends, relatives etc. or 'generalised others' such as teachers.

The idea of lifeworld supports the social generation of meaning as a linguistically driven social interactivity. This idea is expanded by 'socio-cultural' theorists who link the notion of social interactivity to overarching social, historical and cultural contexts, again through language. To Lave (1988) meaning-making is a product of the 'dialectical interaction' of the person acting, of the activity, and of the setting. Dialectical interaction can be

accounted for primarily through the 'mediational means' of language, which is social in origin and necessarily culturally constituted (Wertsch 1991).

Constituent to mediational means are different 'forms of speech' (Wertsch 1991). Different forms of learning employ speech in different ways, yet speech has a universal character of addressivity in that it is implicitly concerned with 'audience' with challenging the 'other' to produce counter images and words in some form of response, it is 'dialogic'.

The traditional, transmissive model of teaching negates the dialogic nature of speech. The teacher's speech becomes 'univocal' in that it is uni-directional, it rests on authority. The teacher's meaning is meant to be taken literally, while the purpose of his learners' activity is to master that meaning. This situation sends messages to learners about the 'invisibility' of their lifeworlds, the 'inaudibility' of their voices and their consequent powerlessness to interpret meaning or to critically construct understanding.

An alternative 'multi-voiced dialogue' (Wertsch 1991), privileges learners' socio-culturally situated speech, thereby nourishing their ability to come to know and act on their own terms. Multi-voiced meaning making in learner-centred education allows for the influence of the teacher's voice but provides the space for the learner to play an active role in developing an understanding

through dialogic interchange. Dialogue is fundamental to social constructivist approaches.

SUMMARY and CONCLUSION

In summary this chapter has provided theoretical vantage points for considering the three goals which I felt may produce insights on the research question:

> 'What contribution can social constructivist approaches (to teaching and learning) make to Environmental Education?'

These goals are:

GOAL 1

> Access the conceptualisations of animals perceived as significant by a group of Tsonga students.

The value to an interpretive study of researching social construction as the social negotiation of learners' conceptualisations has been argued by Wals (1992) and Robertson (1993). An important vantage point is provided by their research, namely that conceptualisations are meanings which have a dynamic character located in processes of social negotiation. Goal 2 is an attempt to understand this dynamism in social negotiation by looking at 'formative influences'.

GOAL 2

Seek insights into the formative influences on students' conceptualisations.

In formulating this goal I was aware of the probable complexities involved in trying to unravel 'why' a person's conceptualisations are what they are. While remaining open to the possibility of changes in research design suggested by students' responses, the following vantage points were useful.

The literature on the embeddedness of learning in social experience suggested that a person's conceptualisations are formatively influenced by a social negotiation involving 'collective construction' and 'reconstruction' of meaning, the confirmation of one person's ideas by others.

The concept of 'world view' as a cultural framework that determines how a new concept will be integrated with pre-existing knowledge seems relevant to an exploration of social negotiation. Similarly important is Schutz's notion of 'lifeworld', a focus on the influence of communication between 'significant' or 'generalised' others and the learner through 'language'.

Goal 3 represents an attempt to apply any insights that may be generated, in a pedagogic context. This however is limited, given the constraints of a half-thesis project.

GOAL 3

Data collection will explore to a limited extent the value of social negotiation in developing teaching and learning methodologies in Environmental Education.

The idea of learning as dialectical interactivity with culture, language, significant others etc. may have implications for improved pedagogic approaches. Useful here is Wertsch's proposition that dialectical interaction is primarily linguistic (Wertsch 1991).

This study moved to the Data Collection phase guided by a view of social construction as a dynamic process of learning that is formatively influenced by people of varying degrees of significance, within cultural contexts. Lave's proposal (cited in O'Loughlin, 1992) usefully summarises this view; social negotiation is the dialectical interaction of the person 'acting', of the 'activity', and of the 'setting'

The next chapter describes the design of the study and explains methodological decisions taken.

CHAPTER THREE: METHODOLOGY

INTRODUCTION

Goals that were expected to illuminate the research question have been refined with reference to theory and personal experience in the previous chapter.

Goal 1

Data collection will be designed to interact with conceptualisations of animals perceived as significant by a group of Tsonga students.

Goal 2

Data collection will seek insights into the formative influences on students' conceptualisations.

Goal 3

Data collection will explore to a limited extent the value of social negotiation in developing teaching and learning methodologies in Environmental Education.

Decisions about the design of this study needed to be made within a changing climate of environmental education research (Robottom & Hart, 1993; Janse van Rensburg 1994:28). Popkewitz (1984:35-53) suggested the problem of educational change is linked to the manner in which the problem of learning is articulated, which in turn is influenced by the researcher's paradigm. Paradigms are the frameworks of distinctive assumptions, questions and procedures about ways of seeing, thinking and acting towards the world, that legitimise particular views of knowledge and ways of knowing.

Popkewitz (1984:40) defined a paradigm of the empirical-analytical sciences (NOTES A) that assumes theory to be universal and free from social and historical contexts, since it is only concerned with what it interprets as measurable data. Drawing from my personal experience, and the work of Robertson (1993) and Wals (1992), the way I had posed my research question suggested a shift away from an empirical-analytical research framework.

A more appropriate location for my research interest seemed to lie with an alternative paradigm of the Symbolic Sciences (Popkewitz 1984:41). Here an interpretive approach may be taken where the researcher is concerned to describe the quality (rather than measure the quantity) of social behaviour. Support for an interpretive approach to educational research is found in Berger & Luckmann (1967); Giroux (1988); Goodman (1992).

Lather (1986) supported a paradigm shift that directs researchers to more interpretive social theory where the focus is on **constructed** versus **found worlds**. To Goodman (1992:119) these 'found worlds' of education are the laws of human nature which are believed to control the behaviour of people. And 'constructed worlds' are created by learners through their own social reality, through symbolic communication with themselves and others. To Goodman, educational research can gain insight into processes of learning as construction, by accessing the meanings or understandings that individuals hold.

PHENOMENOLOGICAL RESEARCH APPROACH

At the time of formulating the research approach, two examples of interpretivist-oriented environmental education research concerned with learners' understandings were available. The first, Robertson's (1993) phenomenological study sought to describe participants' consciousness through the qualitatively different ways in which people experience or think about phenomena. His methodology elicited and described students conceptualisations. To Robertson, conceptualisations are the product of a mental process undertaken by individuals which generate understanding of their experiences within their social context.

However Goodman (1992:121) cautioned that the frame of reference of phenomenology does not encourage questions of 'why' certain meanings rather than others dominate within a given milieu:

> ...to dwell on actors' consciousness may conceal the extent to which such consciousness is regulated by underlying structures and social relationships.

Social reality, she continued:

> can only be understood in terms of its embeddedness within a social, political and historical context.

The second study (Wals 1992:45) resonated with Goodman's caution by asking why learners' meanings come to be what they are. The study employed a critical phenomenology that asked 'how' learners come to make sense of their own environment through their everyday interactions within their lifeworlds. Wals then extended the enquiry to obtain new insights into adapting Environmental Education to the social and physical context in which the school is embedded.

Correspondingly, this research was designed as a critically phenomenological enquiry (Wals 1991) into learning as a social constructivist process, through revealing; the 'content' of student teachers' conceptualisations, the 'social negotiation' of those conceptualisations in terms of their 'formative influences', and the 'way' they are used.

METHOD: CASE STUDY

The research will employ two methods; case studies which have the potential to explore subject-centred perspectives (Yin 1988; Cohen & Mannion 1989), and a focus group (Anderson 1990).

PLANNED DATA COLLECTION PROCESS AND INTERPRETATION OF RESULTS

Due to the interpretive nature of this research, the form of data collection was flexible, remaining open to non-directed, free expression of participants' ideas and researcher's interpretation at all times. However, because research goals move from simple 'description' of conceptualisations, to deeper analysis of 'influences' on, and 'use' of conceptualisation, a 'progressive focusing' of interview questions was necessary (Cohen and Mannion, 1989).

Progressive focusing here, means that at each stage the form of interview questions is shaped by data generated in the previous stage. Data collection will unfold through a four stage programme of three individual 'interviews' and a 'focus group'.

DATA COLLECTION TECHNIQUES

Interviews

I chose to conduct individual interviews in the expectation that significant differences would show in the way interviewees think about animals. The importance of an individual approach also arose out of personal observations in the classroom, of a student culture

of consensus rather than a willingness to speak one's mind when in a group.

Focus Group

I planned that the same interviewees would constitute a focus group to explore the pedagogic issues connected to the 'social negotiation of learning', based on data and insights gained from earlier interview stages.

RESEARCH PARTICIPANTS

STAGE 1, INTERVIEW

It was planned that data collection would begin with an exploratory interview, the purpose of which was to obtain reflection and guidance on my research approach. I was concerned about the problems and possibilities likely to arise in cross-cultural communication, and how animals are likely to be viewed by students.

The interviewee was to be a Tsonga speaking colleague on the college staff, Conny. He was proud of many aspects of his Tsonga tradition and was well educated in a modern, Western mode. Because he could articulate both world views so well he gained a special place in college life as; informal counsellor to staff and students, interpreter, master of ceremonies and humorist. The discussion was to be recorded (see APPENDIX 3).

STAGE 2, INITIAL INTERVIEWS WITH STUDENT TEACHERS

The same people were used for Stages 2 and 3. Respondents were chosen by me, from amongst my year 1 to 4 students, where I felt a trusting and open relationship existed. Many were members of the Conservation Society, in which I had an active role.

With reference to the first research goal, I planned to conduct interviews with ten student teachers to elicit their conceptualisations of animals. Before an interview session students were told; that they could say as much or as little as they wished, that they could terminate the interview at any point, and that the interview was confidential, anonymous, simple and without hidden agendas.

The purpose and context of the research was explained only in broad terms so as to avoid the 'correct answer' phenomenon referred to in Chapter 2. It was planned that interviews would be tape recorded (see APPENDIX 2 for an example) at public sites on campus to establish the maximum informality, trust and conversational atmosphere. I had previously observed that 'extra curricular' activities between teachers and students, conducted in private, tended to arouse suspicion in the student body. Staff/student relationships at the time were exacerbated by boycotts.

The Stage 2, Interview Question

Students would be asked to address the interview question through 'brainstorming', a technique commonly used at college, and which I

have found useful in generating discussion around 'difficult' topics. The question was:

> *I want you to do two things; firstly give me a list of 10 animals that are significant to you (significant can be positive or negative), secondly brainstorm the ideas that arise when you think of each animal.*

STAGE 3, IN-DEPTH, INDIVIDUAL INTERVIEWS

I planned to move on to Stage 3 with the same group of students in a residential 'wilderness setting' in the Waterberg Mountains. Most students were very keen to have this experience and I felt that it would provide a focusing context for the data collection.

It was intended that in-depth, individual interviews would address Goal 2 of the study by further exploring the same respondents' conceptualisations of animals, using a focused question developed from analysis of Stage 2 data. The aim would be to gain insights into the formative influences on respondent's conceptualisations, and to generate questions for the Stage 4 focus group.

STAGE 4, FOCUS GROUP

It was intended to follow up from the Stage 2 and 3 interviews with a focus group (Anderson, 1990) involving all those respondents. The idea was to explore social constructivist approaches to teaching and learning in environmental education.

Research participants were to be encouraged to assess the data from the vantage point that learning is a social negotiation of meaning rather than an individual construction of knowledge. During this process, participants would be encouraged to reflect on the value to teaching methodologies of this approach.

Two transcripts (see APPENDICES 1 and 4), were to be used in the group, followed by three questions to stimulate discussion. The discussion was to be recorded (see APPENDIX 1)

It must be noted here that a change in the planned methodological procedure occurred. In circumstances described later (See p.70)the students who participated in Stage 2 and 3 interviews declined to reflect on their conceptualisations as a group. The probable reasons for this reluctance may be connected to taboos(See p.85) and other fears and cautions that are highlighted in the Vignettes, Chapter 4 (See pp.51-69).

I felt it was important for the study to obtain reflection on the data (gained in Stages 1, 2 and 3) from the perspective of teaching and learning methodology. Consequently I arranged for a new Focus Group comprised of practising teachers. The composition of this group is detailed in Chapter 4, (See p.74).

CHAPTER FOUR: RESULTS

Data collection was not a straightforward process, in the sense of moving from a start to a predictable finish. The journey was complicated by the multiple stages of interviews and diverted by unexpected responses around for example, taboos.

On my part I made some fruitless excursions into statistical analyses and other attempts to simplify what was in reality complex data. Trying to identify a simple link between conceptualisations and their formative influences was a case in point. Knowing how a conceptualisation might have been influenced in one context did not necessarily explain how it might be used in another.

STAGE 1 INTERVIEW RESULTS

At the start of the interview Conny was informed of my interest in students' conceptualisations of animals and of the data collection plan. He was asked to comment and responded enthusiastically with a clear articulation of issues pertinent to the research (SEE APPENDIX 3)

i) He reassured me that I would likely find certain patterns of commonly held understandings of animals in the students' responses. He indicated that these may well be: food, health, security and work, spiritual power, medicinal effects, cultural symbolism etc.

ii) He suggested that when discussing environmental issues, disparate ideas of the environment, arising from students' and teachers' cultural differences, are likely to be brought to the classroom. As a start in dealing with this mix, he said it would be important for teachers to explore where their students' ideas arose (the formative influences) and to find alternative methods to engage them.

Although Conny's insights were born of common sense observation, they did resonate with theoretical points arising in the Vantage Points chapter.

STAGE 2 INITIAL INTERVIEWS WITH STUDENT TEACHERS - RESULTS

Overall Impression of Respondents

I was struck by the commitment of all but one of the participants to the interview, their concentration and enthusiasm. Early termination of interviews seemed to arise from emotional exhaustion or second-language burnout. All participants except one, Marcel, who seemed unstimulated by the activity, said they would help with Stage 3.

I felt that the participants allowed me to learn more about their culture in the 30 to 50 minutes of the interviews than in the three months to three years I have known them as my students.

Main Findings - Categories of Conceptualisations Emerging from Results

As an initial exploration of the research question:

> "what contribution can social constructivist approaches (to teaching and learning) make to Environmental Education?"

Stage 2 interview data was analysed for the most commonly held conceptualisations attached to each animal. These are summarised below as:

- *Lions. (9 mentions): Admired for its strength, bravery, cleverness and beauty. King of the jungle. Key part of food chain.*

- *Elephant. (6 mentions): Strong, dangerous but not irresponsible. Cares for its young. Economically important.*

- *Buck. (5 mentions): Food. Beauty.*

- *Goat. (5 mentions): Food. Ritual sacrifices.*

- *Cow. (5 mentions): Meat, milk, skins and labour.*

- *Hares. (5 mentions): Clever. Food.*

- *Dog. (4 mentions): Hunting and guarding. Brave and intelligent.*

- *Cats. (4 mentions). Witchcraft. Useful at home to kill rats.*

- *Owls. (3 mentions): Witchcraft.*

- *Baboon. (3 mentions): Human-like. Witchcraft.*

Data from all initial interviews was examined for different categories of conceptualisation of animals, taking a cue from the range suggested by Conny above, with some additions and deletions. The list of categories was:

- *Practical value to humans (utility, food, medicine):*
- *Mystical/mythical significance to humans (superstition, witchcraft, myth, religion):*
- *Negative value to humans (danger):*
- *Affective value to humans (objects of affection, pets,):*
- *Intrinsic importance (intrinsic qualities, animal rights/eco-philosophy):*
- *Contribution to ecosystems (ecological significance):*

The data was scanned for all references in each category, which were counted and clustered (Janse van Rensburg 1994 pers. comm.). Some supporting quotes from students are included.

Practical value to humans (utility, food, medicine):

references =..... 44

"Hens are not too intelligent e.g. to see that one day they will be eaten, but they are useful, they can wake you in the morning, indicate the presence of a snake and provide food. They have a good memory for their place, have parental care and choose their friends (pecking order). They indicate the presence of human life."

"Lions When I was young I became sick and the Sangoma advised my parents to boil a lion's skin and give me the liquid to drink. I also had to wear the skin, then I was cured."

Mystical/mythical significance to humans (superstition, witchcraft, myth, religion):

references =..... 40

"Owls are also associated with witchcraft because they move at night. In fact an owl can be used by a witch e.g. if an owl cries near to your home then in the morning the family will go the Sangoma to find out the reason for the visitation."

"...it is believed that you should not eat pig because you will be eating demons. You see, Jesus forced the demons out of a man and they ran into the sea as pigs and now some churches forbid their people to think well of pigs".

Negative value to humans (danger):

references =..... 13

"Donkeys, (for) transportation, ploughing. A useless animal. No food value, therefore no value. A stupid animal."

"It was known that a Mamba usually strikes in the head so a woman would be sent to the Mamba's place with a pot of hot porridge on her head, and the snake would be killed by striking that porridge."

Affective value to humans (objects of affection, pets,):

references =..... 16

"Dog is very useful to man. Dogs act according to how they are treated, you can train them for war or to behave in a good way. They bring joy to our children, I love dogs, especially big ones, it is sad to see a dog mistreated like being chained round the neck 24 hours per day."

"Lion is the king of the jungle. It appears often in the bible as a symbol of strength, but it is more than that, seemingly it has integrity. You know that 'out of the lion comes forth sweetness'."

Intrinsic importance (intrinsic qualities, animal rights/eco-philosophy):

references =..... 58

"When I think of hippo I remember in 1980 one was killed for the celebrations to open a new magistrates office. My instincts told me don't eat, since I believed we should not eat just any kind of meat, a cow should be killed since it is meant for eating. It was a shock to me, those guys were cruel. I have that love for any kind of animals. I hated killing chickens when I was a child."

"The monkey was eaten by the Nduna's family, after that people were encouraged to eat monkeys. Now there are very few in our place and I fear that our children will not know that animal. We will reach a situation where we will have to keep 2 monkeys safe in the zoo and go there to see them."

Contribution to ecosystems (ecological significance):

references =..... 9

"Giraffe is an amazing animal, amazing its tallness! It doesn't have a voice and its long neck has only 7 vertebrate bones. Also the way it runs, its movement. Its skin is used for making things. It supplies meat to other animals (as part of the food chain). It doesn't destroy grass and trees much since it only eats leaves right on top."

"Antelope they are important to me because they live in groups which shows some co-operation. They are prey to carnivores...they contribute in the balancing of nature by keeping the grass down. They make paths wherever they go and that is good for other animals."

IN-DEPTH, INDIVIDUAL STAGE 3 INTERVIEWS - RESULTS

The Focus Question

The preceding cluster analysis gives some insight as to the range of ideas a group of Tsonga speaking students might bring to an environmental education situation. However it only contributes to a 'description' of students' meanings. Illumination of the 'process' of negotiating meaning, begs another question, highlighted in the literature review and raised by Conny in the exploratory interview:

> it will be important for teachers to pay attention to the formative influences on students' conceptualisations

Using results from Stage 2 and my personal observations as a college teacher, I addressed Conny's challenge by brainstorming a possible range of formative influences. The result was the following question:

> *I want to discuss with you in more detail the ideas you gave me last time we talked. I want to go through your previous answers. Any ideas you come up with are acceptable. Can you*

think where you got the ideas about each animal from (e.g. from school, college, books, TV, radio or from personal experience or from stories that people in your community have told you including church)?

The Interviews

Two Stage 2 respondents were unwilling to participate in Stage 3, although they were not clear about their reasons. This left eight participants, all of whom completed Stage 3.

In-depth individual interviews took place at suitable points during or between other activities in the nature reserve. All or part of the interviews took place 'on the hoof' so data was recorded in note form. Some interviews lasted only 15 minutes, others up to an hour.

Interpretation of Stage 3 Interviews - Key Findings

All respondents showed continuing enthusiasm and tolerance of my often probing questions. They were enjoying their wilderness experience, no doubt this helped. Generally students were willing to talk freely on a one-to-one basis. As a group they were disinclined to do so (see Stage 4 interviews p72).

The first key finding is that students were largely able to reveal 'formative influences' on their conceptualisations. These have been categorised as:

EXPERIENCE ..... 17 references in the data

TRADITIONAL EXPLANATIONS ..... 19 references in the data

TV\RADIO ..... 5 references in the data

BOOKS ..... 2 references in the data

SCIENCE LESSONS ..... 1 reference in the data

CHURCH ..... 1 reference in the data

The strong shaping influence of the experiential and traditional is evident e.g.

"Dogs (are used for) hunting and guarding. We have no contact with them like whites do. They are basically a wild animal, domesticated for certain purposes. If a dog came along that is not yours, you may even eat it. 'I used to hunt as a child'. I remember in times of hunger that the number of dogs in our village was down, 'every one knew' that it was acceptable to eat dogs at these times."

(Becky)

"I have 'heard' that if a lion is injured it may come to you for help peacefully. If you help it the lion will kill a buck and you can take your share, the lion will then accompany you to your place before returning to eat. If you take the whole animal, then you have started a war. This (fact), I know. 'My grandfather told me' about lions. So many stories! You can now hear my grannies telling the same stories to the little children at home. When I am at home I sometimes tell such stories to my little brothers."

(Themba)

The second and third key findings, are probably more significant (addressed in Chapter 5):

- Many respondents showed that they held 'more than one' conceptualisation of the same animal.

- Different conceptualisations were used differently, 'depending on the context'.

These observations add an important dimension to the view adopted in conclusion of the Vantage Points chapter, that social construction is dynamic social negotiation:

> Social negotiation is the dialectical interaction of the person acting, of the activity, and of the setting.
>
> Lave (cited in O'Loughlin, 1992)

This observation moves the study beyond trying to understand the dynamics of conceptualisation in terms of 'formative influences' on the respondent. Instead by recognising the 'use of conceptualisation in context', a more complex dynamic is acknowledged where the 'person acting' is at the centre of a dialectic with his activity and setting (context).

Who then are these 'persons acting'? To a varying degree students are in transition into the modern world from a background in one of the most remote areas of South Africa. Consider this aspect of

Noel's lifeworld:

"You know, people living in villages are living in fear, there is so much jealousy. Those witch burnings (Shapshak 1996) in Lebowagomo are because of jealousy. The people are burning houses of rich families. The youth go and do terrible things because a Sangoma tells them. Those youth are afraid to speak against Sangomas. We Shangans are embarrassed because we are poor. People in Joburg laugh at Shangans because we are too black and stay in the bush. So we hide here in our traditions. Meanwhile our successful students only want to run away to Joburg and live like Winnie (prominent public figure)."

It was the growth of intimacy between myself and the interviewees, which was vital to my acceptance and understanding of this kind of surprising data. Consequently in this section of the results, I will provide small case studies, in the form of vignettes, Ely (1991:156) of each interviewee.

VIGNETTES OF THE INTERVIEWEES

Becky - his Context and Conceptualisations

I've known him from his first year, when he stood out as one who could respond confidently to the novel, student-centred learning environment. His English was above average and he had the advantage of being male; two things that really seem to count when starting out at college. He was also a thinker.

Becky is now a third year student and getting well known. He is respected by other students and a member of the Student Representative Council, but not outwardly self-seeking. The staff like him as a genuine person who cares about educational and social issues. He submits his assignments and is a nice person to be with. I like him also because he is environmentally concerned and we are both members of the Conservation Club

Becky's lifeworld is strongly influenced by his rural upbringing, his father now deceased, was a farmer. Becky still lives with his mother in the village during vacations. Becky often referenced his 'rural experiences' during the interviews e.g. hunting with dogs or slaughtering sheep and goats:

"Rabbit - is a very clever animal in stories (because it) fools the lion and escapes. My grannies and elders told us (these) stories as children. These are the most common ones for Africans."

"Fish - people with the name Chabalala, are fish-eaters, they prefer fish to beef or chicken, people with some different clan names may not eat fish at all. We learn about this from birth, not every person follows that now, but we know it. Fish have medicinal value, a certain fat is taken from them and used to cure sickness e.g. 'Dunga' a long thin fish. My granny still uses that 'Dunga', even on me. It smells bad."

Becky's conceptualisations have an interesting tension. On the one hand he references superstitious ideas, on the other he makes biologically based observations.

"Cats 'look after' rats and snakes. (They) may be used in witchcraft, especially if black, such a cat is 'goya' i.e. it is 'wild and untrustworthy'.

Every one knows that black is a witches colour (though) I have not personally seen a witch using a cat. It is difficult to talk about such things because you will not understand. It makes me afraid."

"A Sangoma can go and charm a snake in the bush and bring it to cure people. If you are brave enough he will let the snake's tongue lick you and you will be cured. To the community a snake is dangerous, if you see it you will want to kill it."

"How do you know this about Sangomas?"

"It is difficult to know a Sangoma's secrets. No I have never seen this work with a snake. But I have heard these stories so many times. You see I just know it is true. I can not go and say the Sangoma is wrong. Let's talk about something else Neil."

"Are mosquitoes animals?"

"No, mosquitoes are not animals. In the village we say that

'someone brought a bag of mosquitoes', meaning that this pestilence was the result of human bad intent."

"Do you believe this?"

"I think this is a funny story - people at home would say that thing. In Biology class we looked at mosquito babies in water so I know that they come from eggs etc."

Becky lives with these paradoxical notions. He says the right thing at the right time - or nothing at all.

"I remember when we were learning about genetics and there was a big talk about God and how people were created. Some Christian students got very annoyed so now I keep quiet."

"Becky, do you ever learn things in Biology at college that do not agree with ideas you got from people in your community at home?"

"There are some things the Biology teacher would laugh (at) if I told him, so I keep quiet. There are some things we need to learn to pass assignments so what is the point? You are the first lecturer I have ever talked to."

"How can I go home and tell my mother that the Sangoma is fooling her? Amongst us blacks we don't argue with people bigger than us (older)."

Key Findings

Both scientific and traditional conceptualisations of animals appeared in this interview, and Becky seemed very aware that context governs which ones are expressed. However Becky gave the impression that he would be open to critical engagement with contested ideas if the right teaching approach were available, although the fear associated with taboo subjects might pose problems.

Vanrooi - his Context and Conceptualisations

Vanrooi is a young man with the old-world charm one expects to find in the dignified, peasant farmers of rural Zimbabwe; sustained by nature, tradition and religion. This is far less the case even in rural Gazankulu, for Vanrooi is also the product of an industrial South Africa, brought in contact with him by the migrant labour system, television, and now his experiences at college.

Many of Vanrooi's conceptualisations of animals have an independent quality, the product of personal observation and free thinking:

"In many ways baboons are like a human being e.g. they understand the need for unity in life, they move in groups and seem to have marriage, they can be seen teaching their young how to behave. They walk in the way of a 'model' as if they were in a beauty contest - proud of themselves and self-confident. They have high survivability, can outwit humans and dogs and escape from lions by climbing trees. On the other hand they seem to have a low I.Q.

level because they have a bad memory, can't count beyond three and will destroy a field of mealies just for a few cobs."

Vanrooi stands out amongst fellow students as someone who feels free to think for himself, even in areas of superstition. He feels he has 'protection' to do so:

"There are many stories because some people fear baboons as witches. No I don't worry about witches because we are a church family and God protects us. I do not talk about baboons because it can give me trouble at home (village), but I like to observe them. In many ways they are like people. Even in college I don't talk about them, only to people in the Conservation Club - like now when we are in this place (nature reserve)."

Although Vanrooi does not adopt superstitious interpretations of the world, he is clear about their inhibiting effect on freedom of thought and action. While he feels protected by his church from the actions of witches, the extent of that protection, against the actions of ordinary people (being branded himself a witch), seems doubtful.

"When we come to this place (nature reserve), we are not afraid of witches because there are people here who do not believe, like you and the teachers - but at home I must be careful. If someone hates you they can call you a witch and then you have trouble or you must find money to get the Sangoma. So it does matter what you think.

But here I am free. I can think what I like."

Here Vanrooi has linked 'context' with freedom of thought, the use of different conceptualisations in different settings. It is an important issue to him:

"When I will be a teacher then I can discuss what I want because no one can speak against me."

"I want to live in a place where I can do what I want. It is not enough to go to Pietersburg, you have heard of the witch-burning there. I think many people go to Joburg to escape that thing."

Key Findings

Vanrooi seemed highly sensitised to the link between what he can say and where he can safely say it. To him this was an issue of his freedom of expression in the face of members of his community wishing to condemn and control him.

John - his Context and Conceptualisations

John is quiet and introverted. He is softly spoken with a shy, self deprecating smile. In the initial interview I had expected John to be reticent, but he warmed to the opportunity to talk and surprised me with his responses. Both of us were emotionally tired by the end of the interview even though it did not run its full course. I was bemused at the sort of information I had been privy to, but did not suspect its authenticity; John had given too much of himself.

The second time round, John also prematurely terminated the interview after opening the door to his inner life wider than I have come to expect from my students. Why this ambivalence? Perhaps he was wanting something from me that is missing in his life so far?

John's lifeworld is rooted in his fear of his tyrannical, migrant father, and a protectiveness of his oppressed mother who lives in the now deceased man's house with his other wives. Added to this is John's complexed relationship with witchcraft, which emerges in the way he conceptualises animals:

"When I was young I became sick and the Sangoma advised my parents to boil a lion's skin and give me the liquid to drink. I also had to wear the skin, then I was cured. I still have that skin and when I see a lion I see a saviour. I love lions and want them to be preserved because they saved my life and coming generations should be able to know about them. I hate seeing them killed because in the long run we may come short (suffer)."

John the 'person acting' has changed but the 'setting' of life at home, in his father's shadow, and in some sort of emotional debt to his mother, has not:

"My father is now late. You see he was the strict one. Even though he worked in Joburg my mothers were afraid of him. He could cut their money and they would suffer. Their children would suffer. So

if I made my father angry my mother would be hungry and the big mother would say that she is calling down problems on the family name. I could also be beaten, my mother could be beaten. There are even worse things. And now I keep quiet at home, only I don't kill chickens."

John's ultimate solution is to change the setting, to be himself and think for himself:

"One day I will move from that place (village) and go to Tzaneen to be free." (John became very emotional at this point)

John, is it wrong for me to ask these questions?

"You are bigger (older) than me - so you can ask."

"When you talked about ostriches and goats last time, you said that witchcraft helped your family, but you don't like witchcraft. So what can you say about that?"

"Witchcraft is cruel. It is very difficult for me to say this - but there are things I cannot talk to you about."

"Would you be able to talk to some of your friends here at college?"

"Yes some."

Key Findings

John referred to conceptualisations, that have been socially negotiated within different settings (witchcraft, authoritarian father, the new college situation).

He seemed to think that freedom of ideas and expression can only come by changing settings physically. However this interview alerted me to the idea that some settings are 'psychological'. There is a sense that John's deceased father continues as a 'setting', a discourse inside John's head. Perhaps this explains John's ambivalent, emotional response to the interview and to the researcher.

Themba - his Context and Conceptualisations

Themba is a conservative student from a traditional family in Kwa Zulu Natal. His reaction to both interviews and the experience of the nature reserve, was rather level and uninspired. This was probably exacerbated by his poor English. Overall Themba gave the impression that what he knows about animals is what there is to know.

Themba seemed at ease with traditional stories as explanations of animals, and was involved in passing on those sort of understandings to children.

"I've heard tales about how they used to trap snakes e.g. they would put a horse in that place and when the Python had swallowed

that animal it could not move and would be killed. It was known that a Mamba usually strikes in the head so a woman would be sent to the Mamba's place with a pot of hot porridge on her head, and the snake would be killed by striking that porridge."

"Where did you learn these things about snakes?"

"I can't remember. People talk a lot about snakes. In my township there are not so many snakes - the children kill them. A Cobra, a Puff Adder? I have never seen them. But at my father's place in the north there are many. Yes maybe it was the old people who told me that story about Mambas. Every one knows that story. I have even heard it here at college. No I did not hear it in books. We never have books like that at school."

"I have heard that if a lion is injured it may come to you for help peacefully. If you help it the lion will kill a buck and you can take your share, the lion will then accompany you to your place before returning to eat. If you take the whole animal, then you have started a war. How do I know this? My grandfather told me about lions, so many stories. You can now hear my grannies telling the same stories to the little children at home. When I am at home I sometimes tell such stories to my little brothers. Other animals in stories are hares and baboons - and buck. Yes and snakes."

Themba referred to animals in terms of witchcraft, again the source was anecdotal rather than from direct experience:

"Baboons are afraid of blood and red articles. In Africa it is believed that they are favoured by witches who keep them and send them in the night to spread muti. It is said that the witches even teach them to talk...Baboons are the only big animals that I see. You know when I am moving in a taxi to Joburg you can see them. Then people in the taxi start talking about them. People tell many stories about animals, especially the old ones".

But Themba was not comfortable talking about witchcraft with reference to himself:

"Do people talk about animals used by witches when you are riding in the taxi?"

"No."

"Can you talk to me about witches?"

"No. If I talk to you now - tonight I will be afraid."

"You are a Biology student at college. Many of the things you have told me are things scientists would say about animals. But that story of the witches teaching baboons to talk - what would Harold (Biology lecturer) say?"

"He would laugh. I know it sounds funny, but if I laugh at those stories - tonight I will be crying - especially in this place.

Key Findings

Themba seemed unaware that his conceptualisations might be viewed differently by others. There was no sense that he needs, wants or is able to adjust what he says in different settings. His unwillingness to talk about witchcraft may be an exception, or it may simply be the result of a powerful taboo.

David - his Context and Conceptualisations

On the surface, David seemed an unremarkable, easy-going young man. There is little about him that suggested the complex and contradictory conceptualisations he would reveal about his home life.

As David become more disclosing during the interviews, he also became more emotionally vulnerable, perhaps caught up in these contradictions. On the one hand David's conceptualisations of animals were superstitious; remarkable for their detail, theatrical power and fearfulness. On the other he was able to view the same animals quite differently. (SEE APPENDIX 2)

"Hyena - What I know is that it is dangerous, and in rural areas is used by witches who send hyenas to kill people, or their hyenas can be trained to turn people into zombies by their howling. When you bury such a victim's body you are burying the hyena meanwhile the person himself has been taken by witchcraft."

"...I have never seen a hyena...I would like to see one. In the Elim district there are no longer hyenas ... How do I know these stories about them? I can say that I just know them because people talk about these strange things. And I have met a person who met a zombie at night - the same night that his brother died. It was terrible because this man was screaming and his body came open and a black snake came out. So every one knew that he was a victim of witchcraft. The Nyangas could not make his body rest - it was shaking. So they put big rocks on top of him on the ground. Even now nobody can go to that place where his grave is. In 1992 some witches were burnt in Elim - I think because of this evil."

"What would you say if I told you that scientifically it is impossible for a snake to come out of a persons body?"

"You don't believe what I told you about a man taking off his ears? But I saw that happen! You can say that these things are not true, but maybe these things do not happen in your country - so you do not need to be afraid. How can I say that I am not afraid. If I go home and say that I am not afraid - people will say that I am bewitched, because only witches are not afraid."

"I remember in 1992 a monkey was killed and it was believed that if the Nduna ate it then the village would be secure from witchcraft. The monkey was eaten by the Nduna's family, after that people were encouraged to eat monkeys. Now there are very few. I fear that our children will not know that animal. We will reach a situation where

we will have to keep two monkeys safe in the zoo and go there to see them. One day there will be no more witchcraft and we can live in peace with each other and then we must have wild animals for their beauty."

Key Findings

There are good insights into social negotiation in this interview. David seemed to understand that his conceptualisations, in this case about witchcraft, were connected to setting and to activity:

"You (researcher) are not afraid to talk and it helps me to see it (witchcraft) in a different way. We do not even talk about these things in the Conservation Club. It is good that we are all here together (in the game reserve) - it helps us a lot."

"How will you be free (from witchcraft)?"

"I will have to leave my home. But I cannot do that because my brothers will need my help for their studies. Sometimes I feel too bad to leave my community."

Eddy - his Context and Conceptualisations

Eddy is a confident student who stands out from the crowd as an independent thinker. He spoke dispassionately about himself and his community from a perspective located in tradition but also in socio-economic change. (His home area Bushbuckridge, has a unique history in Gazankulu, having developed early industrial links with

the Witwatersrand. It is more like an urban township but located in rural Mpumalanga, as such it is a point of social and economic transformation.)

This interview was insightful about the nature and use of conceptualisations of animals that are possible in the setting of a socially and economically transforming society.

"Many people at home fear certain animals because they are said to be black magic. You cannot tell such people that now we must care for dangerous animals. Even here at college some students are educated, but they hate the bush because they want to be different from their parents, they go (away) and live in a modern house...You don't see wealthy blacks enjoying animals, like dogs or horses - they have moved away from animals, even if they were herd boys at one time."

"If someone is making a big celebration, they will slaughter an ox or a goat. But any way, the meat is red and people like that. Yes red meat is better, it is a traditional thing."

"So why do you now like white meat? Why have you changed from your traditions?"

"Because I have learnt new things. When I look at all the cattle in Bushbuckridge I can see that there are too many. And goats, no one cares for their goats. The place is being destroyed. There is a

place called Eco Link in White River, they come and talk to the community about these problems to tell us to grow rabbits and hens instead of goats. That is right. We have to look at our traditions and see if they are OK for our life today."

Key Findings

An interesting point arising from this interview is that 'social transformation increases the range of settings for social negotiation and consequently the likelihood of multiple conceptualisations developing'. (including environmentally related conceptualisations, this will be taken up in Chapter 5).

Noel - his Context and Conceptualisations

Noel is older than the other interviewees, has come to teaching from employment in industry, is more sure of himself, has his own family and speaks from a depth of experience.

Noel's lifeworld experience has two very different 'significant others' his Inhanga (traditional doctor), father and a Catholic missionary. His descriptions of how these institutions operate, provide useful insights into some of the more important settings that influence people's conceptualisations.

"When I was a child my father taught us all the traditions. Our lives were full of fear of magic powers and our ancestors."

"(When my father died) a missionary helped me to think about things in a different way...I had the church to protect me. (Then) when I moved to Nkoakoa to finish my matric, nobody talked about black magic to me, only God. So today I have my own house and the church protects me. One day I will not need even that church but I will make my boy a catholic for his own security."

(Researcher) "It sounds as if pupils at school would also have a lot of fear and superstition in their minds?"

"Yes of course, but not all. If the ZCC (church) is very strong in a place then pupils will have God on their minds. If you go to Giyani High school there is very little superstition because the parents are government workers and Baptists. These parents believe in sending their children to be doctors and lawyers at Wits (university). They know that they will laugh at traditional ideas in such places. So they send their children to Khanyisa (private school) to learn science and commercial subjects."

His comments about the dynamics of certain teaching settings are challenging:

"(Researcher) some students believe God made animals the way we see them today even while they are studying theories about evolution and genetics in Biology."

"Many students believe such things, but they do not talk about them in front of lecturers...I can tell you some things, but you must not tell others what I say. Some students are afraid to speak because they might fail their courses. They say that the white lecturers are good but they don't respect our culture...(but students) are hiding in their so-called culture because they are lazy to change and they themselves are living in darkness."

Key Findings

Noel's data provides a rich source of support for the notion that conceptualisations exist in dynamic relationship with their context, be it the world of the Inhanga, the Catholic church or the science classroom. In terms of the latter his comment about transmissive teaching, as a setting, challenges educators to consider; what processes of social negotiation are actually occurring, how are the lifeworlds of the learners (actors) being engaged, and how appropriate is the activity?

Innocent - his Context and Conceptualisations

Innocent is a quiet, unassuming student who is strongly defined by village allegiances. He is part of the conservative body of religious fundamentalist students who seem to conceptualise life according to certainties; such as appropriate roles for men and women, and what is acceptable as knowledge etc.

Because I do not share Innocent's certainties, I find such students hard to get close to, and I suspect they would have similar

feelings about me. This may explain why Innocent is the only religious, fundamentalist, student involved in this study and then only because of our shared interest in the Conservation Club.

Predictably, strong fundamentalist conceptualisations run through his responses:

"I think of pig as an edible meat, but one which I should not touch. (Because) Jesus forced the demons out of a man and they ran into the sea as pigs."

(Researcher) "Why is it good to eat sheep and not good to eat pigs?"

"The sheep is holy. Donkeys and cattle are also holy - they were in the stable when baby Jesus was born."

The conceptualisations that define Innocent's membership of the Apostolic church have been socially negotiated in the setting of traditional village life with, amongst other things, its institutions of Sangoma, superstition and witchcraft. While Innocent asserts his church's separation from such 'ungodly' things, there is evidence of 'co-habitation'. For example Innocent believes in witchcraft but his protection is the church Minister, rather than the Sangoma:

"...people are naughty they use owls to perform their mischief, I

mean the witches. When I see an owl I will panic, I'll think of witches and feel that I will be faced with problems in future because that owl is not a good thing to see during the day."

(Researcher) "Does the church tell you that an owl is a bad thing?"

"The bible tells us that the devil finds ways to do his evil things. Witches are devils, so we must keep away from them."

(Researcher) "If an owl comes to sit on the roof of your house, would your family visit a Sangoma?"

"Definitely not. We keep away from those people. God is our father - we go to him for help against the devil. Our minister is the one we visit to pray and sing."

Innocent's dissatisfaction with the Biology teacher is shared to a degree by several other interviewees. But the barrier he erects against any accommodation with the lecturer's point of view operates in the same way as taboos against questioning witchcraft referenced by others. The effect is to prevent any re-negotiation of conceptualisations.

(Researcher) "You are a Biology student, what do you think when your lecturer talks about the evolution of species, meanwhile you believe in Noah's ark?"

"We know that such ideas are wrong. We cannot speak out because we know that those lecturers are in darkness. I can say that we pity them, one day God will speak to them. If that lecturer was a member of our church, then we could criticise him for speaking against the word of God."

Key Findings

It seems likely that Innocent would refute the concept of social negotiation since he claims that knowledge is derived from God via the bible. Innocent's fundamentalist Christianity and witchcraft seem to have commonalities rather than absolute separation.

However Innocent's absolute rejection of an evolutionary conceptualisation of animals may not be a barrier to environmental education:

"...the bible commands us to look after God's creation. That is why I support the conservation club."

STAGE 4 FOCUS GROUP

This group did not take place as planned. I did attempt to run a focus group around the camp fire with the students on our last night at the nature reserve but it proved problematic. The students were tired, a hot wind made everyone uncomfortable and tape recording or note taking impossible. When we moved indoors the heat was intolerable. The most significant problem though was the reluctance of students to talk as a group about sensitive issues

they had raised in the privacy of a one-to-one interview.

I rearranged the focus group some time later with local, practising teachers, most of whom I knew. I couldn't be sure that the same thing would not happen again but at least they were more mature. Two were also ex-college graduates, who I knew to be confident, critical thinkers. These were:

- Charmaine a pillar of her church, daughter of a middle class Gazankulu civil servant and product of a well resourced Giyani school. From her first year at Giyani college she stood out as a self-confident student. Charmaine teaches at Bigboy's primary school.

- John is Charmaine's elder brother and shares some of her lifeworld experiences, including graduating from Giyani College. He is much more the radical thinker, more impatient and confrontational. He is a progressive secondary teacher.

- Bigboy is one of the younger principals in the Giyani area. He is respected as one who is committed to improving his badly under-resourced, village primary school. He has struggled against financial odds to succeed and could be described as rather conservative in his attitudes to change.

- Fani is also a graduate of Giyani College and now a village primary school teacher near Giyani. He is quiet and thoughtful

but not too communicative, consequently it is difficult to know his attitudes to education and change.

- Hlekani is a graduate of a different, more conventional, teaching college and seems not to have been exposed to progressive educational approaches. Like many women in this region she is deferential to men and other traditional figures of 'authority' - at least in public.

- Rose is Hlekani's friend and shares the same educational background. She is very quiet and is as yet an 'unknown quantity'.

The group took place on a hot and sleepy Saturday afternoon in my home. The timing was bad since everyone had eaten well and felt sleepy, but inviting them for lunch was the best way to ensure attendance. In order to tape record the results I would have needed to place the microphone centrally. This in turn would have meant a commitment on the part of the interviewees to remain vertical in their seats (close to the microphone). I soon gave up on the tape recording and took notes by hand.

INTRODUCING THE FOCUS QUESTIONS

I explained that my research is based on the theory that 'the understandings learners bring to a class are important for teaching'. For example in the case of Environmental Education I suggested, if you were teaching children that in their village,

living things including humans, depend on each other in many ways, then you may need to show your pupils some examples. You may choose to say that owls should be respected and not killed because they control rats. But some of your pupils may be thinking that you are a lover of witchcraft.

I continued to tell them that my research has already elicited through individual interviews, some understandings that college students have about animals and how they arose. Now I would like to share some of this data and ask how you can get to know what your pupils are thinking, especially about sensitive topics and especially in a multi-cultural situation. (SEE APPENDIX 1 FOR A FULL TRANSCRIPT OF THIS DISCUSSION, AND TWO OTHER DOCUMENTS, APPENDICES 2 AND 4, USED DURING ITS COURSE).

Two kinds of results have been identified:

- The focus group as an 'example of social negotiation in action'.
- Insights about 'using social negotiation in a learning setting'.

THE FOCUS GROUP AS SOCIAL NEGOTIATION IN ACTION

Insights can be obtained into processes of social negotiation by looking at data in terms of Lave's dialectical interaction between the 'setting', 'actors' and the 'activity' of the focus group.

The Physical Setting

Holding the focus group in the researcher's house on campus, was probably significant, since it was a novel, out of school context associated with the educational idealism of Giyani College:

"but you guys in GCE learn all these new ideas, but we still sit in bad schools - no books, nothing is changed." (Bigboy)

The Psychological Setting

A significant aspect of the focus group setting, was the presence of a range of conceptualisations relating to educational transformation. (Transformation being a controversial reference point in that year of major political change.)

These conceptualisations manifested a tension between an idealist and a realist view of education:

"But he's saying to look at new ways of teaching (getting impatient)." (John)

"But we are playing around, the kids have to learn and pass (annoyed)." (Bigboy)

There was also a tension between traditionalist and progressive views of what should be appropriate educational concern. For example Charmaine, as a progressive, uses 'drama in education' techniques to tackle problematic areas in her pupils' lives, but

against a backdrop of resistance amongst colleagues and parents:

"There are many teachers who do not care about sex education because (it is considered) bad to talk in that way, but the girls get no help - they get pregnant and they just leave school. You see I am teaching sex education at my school - not for darkness but for light."

Or when Charmaine was asked if superstitious beliefs could be addressed in a similar way, she cautioned:

> "it would be a problem (but)...its strange Neil - but it could be easier for you. No one, no parent could accuse you of spreading magic - because you are different (white)."

However the institutional disadvantaging of black schools through the Department of Education and Culture (DET), was a concern to both 'progressives' and 'conservatives':

Charmaine felt that it was "...important that pupils understand, and not only memorise, (since) that was the (approach of the) DET."

And Bigboy, the more conservative school principle was reminded by John that he has instituted:

"... changes in your school - you get up and do it."

Central to DET education are particular views of teaching and learning; the teacher as 'authority', transmitting knowledge to the 'ignorant', often as self-appointed 'agent of God'. In this traditional view the learner is disempowered, her own constructs are ignored and her critical thought discouraged:

> "As teachers we have knowledge, we have God - so we can enlighten our pupils. When we are teaching, say Geography or Biology, we don't ask pupils what they think. We just teach them and they pass (the exams)". (Bigboy)

A more progressive view came from Charmaine:

> "...it is important that pupils understand and not only memorise - that was the DET; now we want better."

And a range of motivations for progressive teaching appeared:

> "God wants us teachers to help the pupils - we do not have to be afraid to ask what they think." (Charmaine)

John on the other hand finds a secular motivation:

> "I am not a churchgoer...I find at my school that kids respect you if you let them give out their ideas...we must start with what the pupils know."

The Actors

A further dimension of the social negotiation process was the actors. Significant among them were Bigboy, Charmaine and John. Their interaction occurring at the level of their conceptualisations, is described above. At another level they can be thought of as interacting lifeworlds:

Bigboy is one of the younger principals in the Giyani area. He is respected as one who is committed to improving his badly under-resourced, village primary school; though his concern seems to be with the status quo rather than progressive curriculum change.

Bigboy's lifeworld has been shaped by finding a way out of rural poverty through schooling and a career in education. His rather conservative ideas about teaching and learning were probably conditioned by the 12 years he spent as a pupil under Bantu Education, and the three years in a DET teachers' college. Through the church, in common with many teachers, he sees teaching as doing God's work.

Charmaine is also a pillar of her church but there the similarity with Bigboy ends, for she is the daughter of a middle class Gazankulu civil servant and attended a well resourced Giyani school. From her first year at Giyani college she stood out as a self-confident student who flourished in her drama studies. She confronted gender norms by being elected the first female member of the Student Representative Council.

As my Teaching Skills student, Charmaine quickly embraced a learner centred methodology; becoming conversant with concepts of group work, teacher facilitation and acknowledging prior learning. She is a committed teacher driven by deep concern for her pupils' all round development.

John is Charmaine's elder brother and shares some of her lifeworld experiences, including graduating from Giyani College. He is much more the radical thinker, more impatient and confrontational. I recall him as one of the few students who could see the politics of educational transformation in terms of students' personal change (as opposed to calls for government action). He is a progressive teacher apparently unmotivated by religion.

Bigboy had quite a confrontational presence throughout the session, whereas John and Charmaine found ways to facilitate accommodation. For example after the first rather discordant few minutes, I was asked to re-explain the purpose of the session. John and Charmaine came to the rescue by explaining their Giyani College experiences - they had seen multicultural schools on residential Teaching Experience in Johannesburg. Their clarifications were useful to the others.

I observed part way through the focus group, that Bigboy and John began to pull together and that Charmaine was informally coordinating (much like the group-work methods the Giyani College students use).

What I saw happening reminded me of my own college classes i.e when I found myself talking too much, or there was no response from students, or just that impenetrable silence; then it was important to ask them to discuss in groups. Its as if the students did not want to say the wrong thing, they had to 'check it out' with others and come up with a consensus. Or some students just didn't understand in the first place, and needed to talk it over for clarity.

The Activity

Another dimension of the social negotiation process, was the way the focus group itself was run. Care was taken to establish a non-threatening context where participants' existing constructs were valued, and all contributions were acceptable in a supportive atmosphere. The use of group discussion seemed an effective facilitation of this process.

USING SOCIAL NEGOTIATION - INSIGHTS FROM THE FOCUS GROUP FOR OTHER LEARNING SETTINGS.

It is worth noting the following:

- Cross cultural settings can be problematic:

> "I never met a white man (I mean) - I never talked in such a way (to one)." (Hlekani)

- The problematic role of religion in inhibiting social

negotiation, in the form of taboos about what can be discussed:

"Look, she is saying you can't talk about witchcraft - it is a sin in the eyes of God." (John)

- Eliciting conceptualisations depends on establishing trust:

"There are things we don't say - if you are Christian, a churchgoer - it is sinful. I'm surprised they (students) talked to you - they said such things!" (Bigboy)

"Neil knows these students - they are not afraid of him." (John)

- Some potentially useful methodologies for establishing a trusting and non-threatening setting for social negotiation, arose from a dialogue centred on Charmaine:

"Do you think some people would be cautious about talking about some of their ideas?" (Researcher)

"They would be, yes - but if they know you and respect you." (Charmaine)

"But Charmaine, you use songs with your sex education groups to make them easy - I mean so that they are willing to talk." (Bigboy)

"Charmaine, how do songs help you, I mean help the pupils?" (Researcher)

"You know the children like to sing - they make up songs about many things - so I just ask them to make a song about say becoming pregnant, or boyfriends. I give them a time and they do it." (Charmaine)

"Could you do that with environment lessons?" (Rose)

"Yes Rose. You know the boys sing when they are hunting with the dogs. The girls and women sing when they're collecting in the veldt. Why not sing about walking far to collect wood?" (Charmaine)

"When the song is over, what do you do next - I mean with sex education?" (Researcher)

"One time we made a drama to show the school - many mothers and women came. It is difficult to talk about sex matters - but this time everyone was enjoying because it was funny." (Charmaine)

"Could you do a drama about witchcraft?" (Researcher)

"Maybe - it would be a problem - no I think so." (Charmaine)

"You know, I asked the students where they got their ideas from, what influenced a particular idea? Far and away the most frequent influences were personal experience and stories, not school or books or TV. Now what do you think about that?" (Researcher)

"No this is not surprising. People in Gazankulu - I mean Northern Transvaal don't read much. They talk, they have stories and parables for so many things." (Fani)

"So you mean an oral culture?" (Researcher)

"Yes." (Fani)

"So would singing and drama be a good way to tackle ideas acquired by experience and stories?" (Researcher)

"It would be, yes." (Fani)

"Do you think tackling witchcraft would be a problem?" (Researcher)

"Look, it could be a problem if you look at it - in a way personally. If someone believes in Zombies they will not tell you because of fear. But in a way you could approach it not in a straight way." (John)

"Indirectly?" (Charmaine)

"Yes. I mean ask them to feedback on a story - or write a story - or make a drama about someone else." (John)

Comment

This chapter has provided an overview of the data collected, but I fear has not done justice to the richness of material some interviewees presented. The Discussion chapter to follow will relate aspects of the Results to the Research Question and theoretical and personal perspectives contained within the Vantage Points chapter.

CHAPTER FIVE: DISCUSSION

The initial process of interpretation which commenced in the Results Chapter produced Key Findings in the following areas:

- Clusters of students' conceptualisations about animals
- Formative influences on these conceptualisations
- The existence of multiple conceptualisations of the same topic
- The contextual use of conceptualisations

In this Discussion chapter interpretation of the data will proceed further through an exploration of two connected questions:

What aspects of the Key Findings are relevant to the Research Goals?

The reader is reminded that these goals were:

- Goal 1: To access the conceptualisations of animals perceived as significant by a group of Tsonga students.
- Goal 2: To seek insights into the formative influences on students' conceptualisations.
- Goal 3: To explore to a limited extent the value of social negotiation in developing teaching and learning methodologies in Environmental Education.

What is the implication of these aspects for the Research Question?

Namely:

> what contribution can social constructivist approaches (to teaching and learning) make to Environmental Education ?

KEY FINDINGS RELEVANT TO THE RESEARCH GOALS

Stage 2 Interviews produced clustered descriptions of students' conceptualisations as described in Chapter 4. Aspects of these findings relevant to Goal 1 are:

- Individual interviews with students were effective in eliciting a wide range of their conceptualisations of animals. The content of many students' conceptualisations, together with their formative influences mentioned below, was revealing. In most instances the relatively short time spent in interviews taught me more about my students than years of classroom contact.

- Each student's conceptualisations had commonalities with those of other students, but there were also differences between students. Consequently, knowing individual conceptualisations is likely to have limited pedagogic value, since it would not be possible to generalise from the individual learner to the whole class. Although I feel the content of students' conceptualisations merits fuller attention, due to limitations

of space, discussion will be restricted to the methodological implication of conceptualisation in the learning setting.

- However, by clustering all students' conceptualisations, insights are possible from the weightings of their conceptualising of animals. This could provide a teacher with generalisations or trends within a given learning situation. For example, in this case I could see that my students' conceptualisations tended to be more often 'superstitious' than 'ecological'. However findings discussed below show that individual students' conceptualisations of the same topic might differ according to the context in which they are used.

Stage 3 Interviews recorded formative influences on the conceptualisations revealed in Stage 2. Aspects of these findings are relevant to Goal 2. They are:

- Most students in this study were willing and able to explore the formative influences on their conceptualisations of animals, at least individually.

- Clustering students' responses revealed a weighting of formative influences towards the experiential and the traditional, as documented and explained in Chapter 4.

These interviews also produced findings which are relevant to

Goal 3:

- While conceptualisation of a given animal could be linked to a particular formative influence, students often held different conceptualisations of the same animal which they used in different contexts.

- Some students consciously used their multiple conceptualisations appropriately to context. Others seemed unaware of using multiple conceptualisations.

- Many of these conceptualisations were associated with earlier periods of a student's life and yet remained current. This would indicate that early conceptualisations do not necessarily become redundant as they are challenged by later ones (e.g. through learning processes), it seems rather that they can co-exist.

- Taboos of various kinds had a significant presence in the participating students' conceptualisations. Such taboos were associated with their experience of superstition, fundamentalist religion 'as well as' the 'unquestioned assumptions' underpinning the teaching of their college subjects (see below with reference to 'knowledge of Science').

IMPLICATIONS OF THE FINDINGS FOR THE RESEARCH QUESTION

The First Consideration in addressing the research question

concerns the nature of constructivism i.e. the range of teaching and learning theories based on the belief that learners' 'construct' their understandings of the world. In constructivist theories, learning is viewed as a process by which learners organise their experiential world, rather than their discovery of an independent pre-existing world external to the mind (Lerman 1994).

From this departure point, constructivist theories diverge (see Chapter 2, p.11). Constructivism is best thought of as a central idea modified by developing movements which co-opt and change educational and social theories (Solomon 1995). While there is a blurring of theoretical boundaries, Solomon identifies two significant movements, differentiated by their essential view of learning as either 'individual' or 'social'.

The First Movement, represented by Von Glasersfeld's (1989) Radical Constructivism is concerned with learning as an individual, evolutionary development. He borrows from Piaget (1929) the notion of 'schemas' i.e. learners' explanatory framework for some aspect of their experience. Schemas persist as long as they remain viable, but are modified when they cannot explain a new phenomenon. Teaching would be concerned with creating learning experiences that challenge the viability of existing schemas and in so doing bring

the learner to a new schema, the 'teacher-defined understanding'.

Klein & Merritt's (1994:16) instructional programme illustrates this approach. Here the assessment element of the programme aims to determine whether students can use the concepts, knowledge and skills they have learnt. Klein & Merritt's presumption is that their programme will modify learners' schemas towards the 'essential scientific ideas' of the syllabus (See p.21).

The Second Movement, represented by Driver's (1988) form of Social Constructivism employs methodologies to elicit learners' 'alternative conceptualisations' and facilitate processes of 'conceptual revision' (including social negotiation) to bring learners to a point of formal knowledge. This desired outcome is frequently stated in constructivist science literature e.g. constructivist science leads children to 'formal scientific knowledge' through encounters with their own practical and experiential knowledge (Louden & Wallace 1994).

There is a significant assumption common[3] to both Driver's (1988) Social Constructivism and Radical Constructivism; that these methodologies offer success in substituting a learner's existing understandings with formal scientific knowledge.

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[3] Although arising from different models of learning, **schemas** (radical constructivism) and **conceptualisations** (social constructivism) are regarded for the purpose of this study as comparable, since they are both explanations for how learners develop understandings.

This assumption is challenged by several findings in this study:

- Students can have multiple conceptualisations of the same topic, using them alternately in different contexts. For example earlier 'informal' conceptualisations, instead of losing their viability, can co-exist with more recent ones e.g. formal scientific knowledge.

- The existence of a variety of taboos, as barriers to conceptual change, raises questions about whether it is possible for the teacher to modify all learners' schemas (relevant to the topic under consideration) through careful planning of classroom experiences.

These findings can be illustrated by re-visiting a learning situation referred to by several interviewees who did not accept the scientific conceptualisation of evolution. Thus in the context of the (transmissive-teaching) Biology class, they offered the teacher the required formal scientific conceptualisation in order to pass the examinations, but indicated privately to me that the biblical conceptualisation was the one that had validity for them. (See Solomon's (1995) reference to intersubjectivity, p.11) For some students their biblical conceptualisations were founded on a non-negotiable dogma that had the strength of a taboo.

This finding reveals that students do hold multiple conceptualisations of evolution and use them differently,

'dependent on social contexts'. Social constructivists (Driver 1988; Watts 1983) accept the idea of multiple conceptualisations, i.e. learners are felt to hold alternative conceptualisations to formal knowledge, but as Solomon (1995:9) points out, they do not recognise the "problem of context-dependency".

Neither do social constructivists acknowledge social taboos. An example of which was a student who was so rigid in his views of evolution that social negotiation did not seem to be possible:

> We cannot speak out because we know that those lecturers are in darkness. I can say that we pity them, one day God will speak to them. If that lecturer was a member of our church, then we could criticise him for speaking against the word of God.

This statement of a taboo, one of many recorded in the study e.g. taboos surrounding 'witchcraft', can be understood as a social mechanism designed to protect a particular conceptualisation from challenge. Taboos would seem to be communicative barriers to social negotiation and thus to teaching methods drawing on social constructivism.

Solomon (1995:15) takes up the issue of communicative barriers to social negotiation with regards to Science teaching. She regards it as problematic that there is a difference between the way the knowledge of 'science' and 'everyday lifeworld' knowledge is

constructed. For example formal conceptualisations of science develop through a "long apprenticeship of learning definitions and solving problems in accepted ways". While in the everyday domain of lifeworld there are no authoritative texts, and communication depends on "frequent reassurances that our understandings make sense to others", through eye contact, nodding of heads etc.

If, as Solomon (1995) suggests, knowledge of Science is presented in such a way that it cannot be challenged by learners, then that knowledge is placed outside any processes of classroom social negotiation, as would be the teacher who represents it. The theoretical basis for this observation is examined in detail in Chapter 2, (See Goodman (1992), p.13). This observation would also have relevance in Environmental Education because bodies of scientific knowledge such as Ecology are often part of the curriculum.

The discussion so far has challenged radical and social constructivist approaches in science teaching from the vantage point of context dependency i.e. the 'social context' (See p.22) in which conceptualisations are used, and certain 'communicative barriers' to social negotiation. Support for which challenge can be found in 'Socio-Cultural' views of learning, as a dynamic process influenced by 'significant others', within cultural and language contexts (Wertsch 1991; O'Loughlin 1992; Ernest 1992a; Lerman 1994)

Lave, (cited in O'Loughlin 1992), usefully expresses a socio-cultural model of learning. Social negotiation, she regards as the 'dialectical interaction' of the person 'acting', of the 'activity', and of the 'setting' (Shotter and Gergen p.23).

The Second Consideration, in addressing the research question is thus the contribution of Lave's socio-cultural learning model to teaching methodologies in Environmental Education.

At this point, I would argue that shifting the social constructivist focus from Science teaching to Environmental Education is not straightforward. For example the EEPI (1993:5) document suggests that the learning process from an environmental education perspective be characterised by "an open and interactive process (dialogue-encounter-reflection) involving both teacher and learners within a holistic political, social, economic and bio-physical context". These objectives are much more complex and socially contextual than those for Science teaching which is primarily concerned with a growth in learners' factual knowledge. Consequently it would seem reasonable that the development of a constructivist methodology for Environmental Education would require a critical assessment of models 'imported' from constructivist Science[4].

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[4] Of the limited social constructivist research in Environmental Education (Robertson 1994a:21), most draws substantially on constructivism in Science education (Brody 1992; Lisowski & Disinger 1992; Klein & Merritt 1994; Robertson 1994a).

For example, Ballantyne & Packer (1996:29) uncritically reference social constructivism in Science when advocating the application of teaching methodologies in Environmental Education. They suggest that teachers: help students to become 'aware' of their own and alternative conceptualisations; 'explore' the implications of these -conceptualisations for the environment; and provide opportunities for 'challenge' to, and 'revision' of a conceptual framework capable of integrating the dimensions of understanding, attitudes and behaviour.

But nowhere in Ballantyne & Packer's (1996) research, which employs essentially the 'conceptual revision' approach associated with Driver's (1988) social constructivism, do they recognise the problems of context dependency and barriers to communication that have surfaced in this study. Neither do they refer to the teacher's role in social negotiation. These observations are ironic given that Ballantyne & Packer specifically set themselves the task of investigating the broader conceptual framework that influences students' understandings.

Palmer's (1995:6) study of children's environmental understandings also employed Driver's (1988) version of social constructivism. It concludes that "teachers (should) pay close attention to progression in (children's) accurate understandings when planning topics on environmental issues". Again there is no recognition that the understandings children might reveal in the classroom context, may differ from the ones they use elsewhere.

However, other articulations of methodological issues in Environmental Education do come closer to complex questions of communication and context (See p.10) and thus make a link with Lave's socio-cultural approach:

In a multi-cultural learning environment the situation is complex...students encounter great difficulties trying to develop a shared sense of meaning...of environmental concepts...(they) have had a wide variety of environmental experiences...poverty, economic constraints, inaccessibility of resources, and the history of policy and politics in South Africa (Winter & Reddy 1996:26).

If the complex and contextual character of Environmental Education is accepted, then what contribution can a socio-cultural perspective make?

LEARNING AS A SPHERE OF INTERACTIONS - IMPLICATIONS FOR ENVIRONMENTAL EDUCATION TEACHING AND LEARNING METHODOLOGY

Lave's formulation of social negotiation can be modelled as a Sphere across whose surface dialectical interactions occur between three loci; the learning context, the learning activity, and the conceptualisations of the actors. These loci shift and blend in response to dynamic forces between them.

This model can be visualised as the rainbow patterns on a water bubble, which constantly change depending on forces applied to its surface. Modelling social negotiation in this way illustrates it as

a complex, dynamic and non-linear process. A socio-cultural perspective encourages a view of the teacher's methodology in a learning situation as an integral part of this complex process. A teacher can be viewed as, variously, instigator of learning activity, creator of context and actor within the learning process.

The practical significance for Environmental Education of the perspective elaborated above, can be revealed by re-examining a situation described in Chapter 2, where I observed a Parks Board Environmental Education Officer lecturing a group of Tsonga speaking teachers on the importance of conservation at the headquarters of the game reserve. Viewing the lecture as a sphere of interactions reveals the complex dynamics of social negotiation occurring, for example:

- The setting of the lecture theatre with no attempt made to change the learning context by moving out into the environment under discussion.

- The historical fact that those sitting passively below the lecturer were members of the same Tsonga communities who had been forcibly removed from the land to create the game reserve.

- The lecturer displayed an authoritarian demeanour exaggerated by his militaristic uniform.

- The teaching was through transmission of formal knowledge, and only about the natural environment.

- The absence of critical discussion and interactive debate, to support transformation of thought and action for resolving environmental issues, (Fien 1993a).

- The failure of the education officer to identify and work with learners' values and emotions relating to issues of conservation.

These diverse elements of this highly structured teaching scenario seem to exemplify a transmissive teaching methodology of Environmental Education that fixes educational context, activity and actors in rigid relationship to each other. However, from Lave's perspective, dialectical interaction (See p.25) between the education officer and his audience did exist but was hidden. An indication of the teachers' reactions was given later in private, I observed them laughing about what the education officer had said; they could 'see the sense' in his views but could not accept them.

A deeper insight can be gained into what dialectical interactions may have occurred in the above scenario if the assumption is made, that teachers then present, may have carried a similar range of conceptualisations to the student teachers interviewed in this study.

The following points arising from the data seem relevant:

- Teachers may have had adverse but concealed reactions to being in a lecture situation, on finding the education officer's conceptualisations in conflict with their own.

- Formal scientific knowledge presented may have been viewed as non-negotiable by the teachers, hence their lack of response.

- The education officer's conceptualisations about the importance of certain animals may have conflicted with teachers' taboos and consequently been ignored.

- The teachers may have had points of reference that were not shared or recognised by the education officer. This possibility is supported by Schutz's (1973) lifeworld theory discussed in Chapter 2.

It would seem reasonable to conclude from this scenario, and other classroom situations I have been involved in, that blockages to social negotiation existed within the conceptualisations of both parties, and the possible variety of understandings of conservation present were neither engaged nor modified, rather existing prejudices were probably reinforced.

In summary, Lave's socio-cultural model informs a perspective on teaching that casts doubt on the suitability for Environmental Education of established transmissive as well as some social constructivist methodologies. But how does this perspective, and the findings of this study, take environmental educators forward to alternative methodological approaches?

It may be helpful here to return to Conny's statement in the pilot interview:

> What we need to explore are alternative methods for Environmental Educators to talk with people, to overcome the problem of seeing things differently e.g. an owl. You see, if educators say "we understand your culture so we are not going to say anything about an owl" then those owls will be destroyed as enemies.

An environmental education methodology that simply reveals conceptualisations is 'interpretivist', it seeks to describe and value knowledge (See p.13) but not to engage the knowledge from a 'critical' perspective. What Conny is implying is that once revealed, conceptualisations need to be challenged and changed through some sort of critical negotiation if the environmental education effort is to be of value.

Support for this view comes from O'Donoghue (1994), who describes Environmental Education as critical, social processes of change. By

encouraging teachers to reveal their own conceptualisations of environmental issues, and to challenge learners', Fien (1993b) moves beyond an interpretivist approach to teaching methods. Instead Fien encourages a critical process of moving with learners towards a vision of a just, peaceful and ecologically sustainable world. in order to do this a teacher should be committed (as opposed to neutral) in her views, and encourage analysis of the social and political contexts that impinge on key environmental issues.

A SOCIALLY CRITICAL CONSTRUCTIVIST TEACHING AND LEARNING METHODOLOGY FOR ENVIRONMENTAL EDUCATION

Fien's 'value explicit' teaching methodology emphasises the need for environmental educators to engage with the world through a socially critical orientation (See p.13). Huckle (1990:31) adds that "appropriate curriculum content and methods can (contribute to solving environmental problems) by cultivating a critical awareness of the structures within which pupils lead their everyday lives".

In support of Huckle's (1993) position, interviews revealed (Chapter 4 pp.48-69) that some students were critically aware of structures that generate tensions in their lives. These students were able to reflect both on problematic aspects of their lifeworlds e.g. taboos, moral indebtedness to their families and superstition, and on possibilities e.g. leaving home for a future life in the cities. In short they indicated a willingness to think in new ways that were informed by new values; in essence they were

engaging with processes of personal and social transformation. It must be noted however that they all mentioned real constraints on being able to publicly translate those thoughts into action.

ENGAGING LEARNERS' EXPERIENCES OF TRANSFORMATION IN ENVIRONMENTAL EDUCATION

In spite of these constraints, it may thus be possible for a socially critical constructivist methodology of Environmental Education to be effective in addressing Conny's challenge of 'finding new ways to talk to people'. This could be done by helping students to identify, acknowledge and explore experiences of personal and social transformation.

It would be a reasonable assumption that all students at the college are experiencing transformation to some degree. For example students (especially women) are seen by conservative 'significant others' at home as agents of economic change for their extended family, but are not expected to challenge traditional norms. However by attending college, students contact a rapidly changing larger world, full of new models of behaviour. Whether they accept transformation, or like the religious fundamentalists resist it, transformation must be a meaningful concept for all students.

The EEPI document (EEPI 1993:4) reminds us that "human resource development is as important in Environmental Education as natural resource conservation". The aim therefore is transformation of people. This study shows that approached through an open and

interactive process[5] students will reveal evidence of personal transformation. This evidence in turn, exposes barriers to communication such as scientific, religious or traditional taboos for what they are, rather than the non-negotiable truths they are claimed to be. An indication of this was the interaction between two of the teachers, [Charmaine & Bigboy] in the Focus Group (Chapter 4 p.72). Therefore in the environmental teaching situation, recognising the existence of change, and the contradictions it brings, may be an effective way to encourage further change.

In the light of the diversity of students' conceptualisations, it may be appropriate to comment on a strand of educational research that highlights an 'African worldview' (Ogunniyi 1995) or 'a non-Western interpretation of reality' (Jegede & Okebukola 1989). These claims that Science learning is problematic for Africans because their worldview is at odds with a 'Western worldview' at least implies that Africans are characterised by a common understanding of the world (See p.20). Even the small sample group of this study reveals a considerable range and transformation of worldviews.

REFLECTIONS ON MY RESEARCH METHODOLOGY

As explained in (Chapter 3), I took care to structure the first two

[5] See Chapter 2, for a discussion of social negotiation as the confirmation of one person's ideas by others, through collective construction and reconstruction of meaning.

rounds of interviews on a one-to-one basis, with students who felt they could trust me. Conceptualisations emerging from most of these interviews were surprisingly revealing and personally sensitive. However, the same students resisted exploration of their conceptualisations in groups with other students. The individual interview methodology was effective, while attempts at group interviews were unproductive. Student group work is an established component of a constructivist teacher's repertoire (Wildermeersch 1989) since, amongst other things, it gives learners confidence. In this case the opposite was true.

On the other hand, the focus group with more mature and independent teachers did generate vigorous engagement with controversial issues that may not have surfaced in individual interviews. It is therefore hard to make clear statements about appropriate research techniques except to support Lave's (1988) view of social negotiation as complex and context dependent. By extension, I would support the need for social constructivist research to take account of the dialectical interaction of the persons acting (researchers and researched), of the activity (interview), and of the setting.

Although I discussed a socially critical constructivist teaching methodology for Environmental Education, the design of a research methodology for the study was not strongly influenced by critical theory. My research methodology fell short of an Action Research approach of exploring and developing the participants'

consciousness-raising and transformation processes (Kemmis 1988).

I feel that an action research approach could have produced further insights on teaching methodologies that explore students' experiences of personal and social transformation. New research could be guided by a view of Environmental Education that engages participants' conceptualisations through a mixture of "critical reflection", and "organisation of action" (Gough & Rowbotom 1993:305). To this I would add important elements of a socio-cultural perspective for Environmental Education. The research process would need to recognise the complex, dynamic and dialectically interactive nature of communication. In short the research could be regarded as a process of social negotiation.

As a final point I would recommend that further research, viewed as social negotiation, could be informed by theories of the social generation of meaning (Chapter 2) as: a linguistically driven social interactivity (Schutz 1973; Werstch 1991).

CHAPTER SIX: CONCLUSION

This study was motivated by two concerns arising from my work as a teacher. The first, arose from difficulties experienced with innovating interactive teaching methodologies with my students. The second, a concern with how to be an effective environmental educator, that developed through frustrating personal conversations with students and observation of a Parks Board education officer's lecture. These experiences highlighted the existence of very different ways of thinking about environmental issues amongst all concerned.

The process of developing the research question, namely what contribution can social constructivist approaches to teaching and learning make to Environmental Education, was essentially the merging of these two concerns around an exploration of theories of constructivist learning.

The theoretical dimension of the research comprised an exploration of a variety of approaches to social constructivism, of which Radical and Social Constructivism as applied in Science education, currently dominate orientations for educational research in constructivist learning. These approaches have been shown to be primarily oriented to bring learners to a point of accepting formal knowledge. Implicit in this orientation is an expectation that these methodologies will succeed in substituting a learner's

existing conceptualisations with teacher-defined ones.

While these approaches may be appropriate for Science teaching which is primarily concerned with a growth in learners' factual knowledge, it has been argued that they are inappropriate methodologies for models of Environmental Education. Since these are characterised by an interactive process of dialogue-encounter-reflection with more complex learning outcomes concerned with the development of learners' knowledge, values, attitudes and action.

This argument is supported by a series of interviews with student teachers which generated the data of this study. My interpretation of the findings challenged the idea that a teacher can rely on substituting his learner's existing conceptualisations with his own, since students held multiple conceptualisations of a given topic which they used differently in different social contexts. Students' early conceptualisations did not necessarily become redundant as they were challenged by later ones (e.g. through formal learning processes). Taboos of various kinds also had a significant presence in the participating students' conceptualisations.

In the light of these challenges Lave's (1988) socio-cultural approach to learning has been explored as the basis to create a more useful perspective on an environmental education situation as a Sphere of Interactions; a complex, dialectical interactivity between teacher and learners, activity and context.

I argued that Lave's socio-cultural approach to learning may be a useful guide to helping a teacher elicit the full range of conceptualisations present in an environmental education situation, but is not ultimately effective if no challenge and change comes about. Consequently, a socially critical constructivist teaching and learning methodology for Environmental Education has been suggested. A key strategy for this methodology is to engage students' experiences of personal and social transformation, as revealed by the results of this study. The argument is that in the environmental teaching situation, recognising the existence of conceptual change in, and the contradictions apparent between, different conceptualisations, may be a possible way to encourage further change in peoples thinking and action.

In summary Lave's socio-cultural approach has much to offer environmental educators since it helps them to avoid over-simplifying the teaching and learning situation and can sensitise them to the often hidden barriers to conceptual engagement and change. This approach combined with a socially critical perspective on the conceptualisations elicited, and on the significance of personal and social change in learners' and teachers' lives, is presented as an answer to the research question.

In conclusion I comment on the interpretive research methodology employed and suggest an example of a socially critical methodology that could take this investigation further.

APPENDIX ONE: TRANSCRIPT OF FOCUS GROUP

Transcript of Focus Group

Bigboy: What is Environmental Education? We don't have it in schools. I agree with what you say; but is it Geography or Agricultural Science?

Researcher: It would be a new approach. You could find it in any subject, but instead of teaching ecosystems like in Biology, now we would look at the importance of people in that situation.

Bigboy: So it would be examined?

Fani: Then there is problem of time - to finish syllabus.

Researcher: Yes, but there may also be new approaches in curriculum to encourage new teaching methods; e.g. topic or project-based teaching.

John: This is like the discussions we had in Teaching Skills - I mean getting away from Department of Education and Training.

Hlekani: We already teach some of this - e.g. overgrazing.

Researcher: OK, but do you ask pupils what they think about it?

Hlekani: They know it is wrong.

Bigboy: But they still do it! How can we change?

Researcher: Do you look at their attitudes. How attitudes come about? How their attitudes are formed socially?

Bigboy: No - no time.

John: But he's saying to look at new ways of teaching (getting impatient).

Bigboy: But we are playing around - the kids have to learn and pass (annoyed).

John: But overgrazing is a big problem - we are becoming a desert in Giyani.

Charmaine: Look you guys, we are not in school now. Neil wants us to think - I mean to imagine something better.

Bigboy: No, OK - but you guys in GCE (Giyani College of Education) learn all these new ideas, but we still sit in bad schools - no books, nothing is changed.

John: But you (Bigboy) have changes in your school - you get up and do it. Maybe you are not used to someone asking what you think.

Charmaine: Listen, do you think environment is important, so lets get on. We are going to sit all day arguing.

Fani: Neil, can you tell us those ideas again.

(I explained introduction points - took clarifications etc.) Some discussion then followed about the multicultural idea.

John and Charmaine were explaining their GCE experiences - they saw multicultural schools on residential teaching experience in Johannesburg. Their clarifications were useful to the others. They were in favour of developing the issues we were discussing as relevant to the New South Africa.

I gave out a transcript from interview Stage two (see APPENDIX TWO). Poured cold drinks while they discussed together. (Animated discussion - everybody now involved.)

Researcher's Observations:

Bigboy and John now pulling together.

Charmaine is informally co-ordinating - much like the group-work the GCE students use in lectures. It looked like she was going to report back the groups' answers to the questions at the end of document. This could be interesting because it may help me explain why a social perspective on construction of ideas is useful.

When participants have read Stage 2 interview transcript, I note their comments.

Charmaine: We think we know these ideas, but we don't talk about them. I mean there are things which are foolish. There are things which all of us know - like about cows and lions. But some things - how can they help when teaching about environment.

Researcher: Which things?

Bigboy: There are things we don't say - if you are Christian, a churchgoer, it is sinful. I'm surprised they talked to you - they said such things!

John: Neil knows these students - they are not afraid of him.

Hlekani: I never met a white man - I never talked in such a way (to one).

Researcher: Could you talk to me now?

Hlekani: I cannot discuss such ideas (offended).

Researcher: What Ideas?

John: Look, she is saying you can't talk about witchcraft - it is a sin in the eyes of God.

Researcher: Are you angry with me to present witchcraft to you?

John: Neil, we know you are serious - you are not playing. But it is hard because we are churchgoers and we don't know how it is important to discuss this for Environmental Education.

Fani: These things are part of our traditions - I don't agree with them, but many pupils at school believe it. Let him explain why it is important.

The Researcher then explained:

That a respected Tsonga teacher (Conny) told me about the need to overcome problem of seeing things differently e.g. the owl. That witchcraft can lead people to hate animals for no good reason (see APPENDIX 3).

Many students showed that they mostly understood animals in terms of their effect on humans therefore, it is hard to see animals ecologically.

So is it possible to understand the implications of animals to ecosystems and to humans, if you fear them or hate them because of witchcraft? (I can feel resistance - they are not accepting the explanation).

I distributed a second transcript - about the most commonly held ideas attached to each animal (see APPENDIX FOUR).

Bigboy: OK, we know these ideas in the list. But why must teachers dirty themselves by talking about the works of the devil? As teachers we have knowledge, we have God - so we can enlighten our pupils.

John: In what way enlighten?

Bigboy: When we are teaching, say Geography or Biology, we don't ask pupils what they think. We just teach them and they pass (the exams).

Researcher: But there are students at GCE who think the Earth is flat - I'm sure some of them passed Geography matric. Does it matter what they think? Some Biology students at GCE think God created the animals 4000 years ago, yet they study genetics. Does it matter what they think? Or does it matter that they pass?

Researcher's Observation:
Long discussion followed, animated and serious. This reminds me of my Teaching Skills classes - when you find you are talking too much, or there is no response from students, or that impenetrable silence - just ask them to discuss in groups. Its as if students don't want to say the wrong thing, they have to check it out with others and come up with a consensus. Or some students just don't understand in the first place and needed to talk it over for clarity.

Charmaine: I think we feel it is important that pupils understand and not only memorise - that was the DET; now we want better. We must know what they think if we want to know if they understand.

God wants us teachers to help the pupils - we do not have to be afraid to ask what they think. We can talk about magic. It can help children to be better in the eyes of God. There are many teachers who do not care about sex education because it is bad to talk in that way, but the girls get no help - they get pregnant and they just leave school. You see I am teaching sex education at my school, not for darkness but for light.

John: I am not a churchgoer, so I don't worry about this I find at my school that kids respect you if you let them give out their ideas, you are showing respect for them. This reminds me of our Teaching Skills Lectures - you used to say that we must start with what the pupils know. That is the place to start.

Researcher: Anyway, its not just witchcraft, there are also ideas about animals as dangerous or as useful.

John: Do you see any difference between the two interviews?

Fani: Obviously No.1 talks a lot about witchcraft, the other only once.

Hlekani: The first one talks like he believes witchcraft stories

- he says people can turn themselves into snakes, etc.

Fani: Yes its incredible that he believes about private parts.

Bigboy: The other one talks about animals - just like they're animals - only he has a funny idea about the owls flying to Cape Town (laughter).

Researcher: So now if you had a group of pupils you were teaching Environmental Education, and some were maybe thinking like No.1 and some like No.2, what would you do?

John: To start off?

Researcher: How would you start?

John: I would have to ask them.

Researcher: Do you think some people would be cautious about talking about some of their ideas?

Charmaine: They would be - yes - but if they know you and respect you.

Bigboy: But Charmaine, you use songs with your sex education groups to make them easy - I mean so that they are willing to talk.

Researcher: Charmaine, how do songs help you, I mean help the

pupils?

Charmaine: You know the children like to sing - they make up songs about many things - so I just ask them to make a song about say becoming pregnant, or boyfriends. I give them a time and they do it.

Rose: Could you do that with environment lessons?

Charmaine: Yes Rose. You know the boys sing when they are hunting with the dogs. The girls and women sing when they're collecting in the veldt. Why not sing about walking far to collect wood?

Researcher: When the song is over, what do you do next - I mean with sex education?

Charmaine: One time we made a drama to show the school - many mothers and women came. It is difficult to talk about sex matters - but this time everyone was enjoying because it was funny.

Researcher: Could you do a drama about witchcraft?

Charmaine: Maybe - it would be a problem - no I think so.

Researcher: Could I do a drama - I mean Ulungu (white person)?

Bigboy: Its strange Neil - but it could be easier for you. No

one - no parent could accuse you of spreading magic - because you are different.

Then I asked the students where they got their ideas from e.g. what influenced a particular idea? I told them far and away the most frequent influence were personal experience and stories, not school or books or TV. And asked what they thought about that?

Fani: No this is not surprising. People in Gazankulu - I mean Northern Transvaal don't read much. They talk, they have stories and parables for so many things.

Researcher: So you mean an oral culture?

Fani: Yes.

Researcher: So would singing and drama be a good way to tackle ideas acquired by experience and stories?

Fani: It would be, yes.

Researcher: Do you think tackling witchcraft would be a problem?

John: Look, it could be a problem if you look at it - in a way personally. If someone believes in Zombies they will not tell you because of fear. But in a way you could approach it not in a straight way.

Charmaine: Indirectly?

John: Yes. I mean ask them to feedback on a story - or write a story - or make a drama about someone else.

Researcher: Last Question about witchcraft. Do you think we should tackle these superstitions in order to teach Environmental Education, or should we ignore it.

Hlekani: Neil, you have given us good reasons to accept, but don't expect too much. This problem of superstition I know very well. It is not all a problem - Sangomas can help us a lot. There is good magic as well as black magic. I am a churchgoer, so I don't move with people who use magic - but I know it is a complicated thing, it is our culture.

Fani: I understand what you are saying my sister, but he is not criticising our culture. He is only putting a question to us that was given by a Shangan himself. If we ignore - the ignorance of many of our people - then we can all suffer. It is not wrong to have children - but it is bad to have many children.

Charmaine: It is the same thing about sex education. There are also bad things in our culture - our children need to know better ideas.

Researcher: Almost all the animals chosen (84%) are largish four-legged mammals. Students could have chosen anything; e.g.

insects, reptiles, birds, fish. Can you explain this?

Bigboy: No that is easy to explain. In Shangan the word animal means something big, and with four legs. If you wanted students to think of all animals, then you must ask for `swivumbiwa' - all animals.

Researcher: Does swivumbiwa include people?

Bigboy: No, people are not animals. In the bible God created man and then the animals; even in Tsonga tradition men are always separate from animals - they are better than animals.

Researcher: That brings me to another point - I know its getting late, but maybe one more question.

In Environmental Education we need to use scientific ideas; e.g. in many ways humans are animals, they need to use the same things like air, food, and water. They depend on ecosystems and other living things. How would you teach the scientific idea that humans are equal to animals in so many ways - not separate by a decision of God.

Bigboy: If I get you right Neil - you are saying we must teach that Science ideas are better than God's ideas? (offended).

Researcher: In college we have Science ideas e.g. the world is round; and animals have evolved through genetic adaptation over

millions of years. But there are students who believe that the earth is flat and God created all living things in one week.

Charmaine: You are right - I know many students who come to college believing those things. Some change. There are many Christians who believe in evolution - it depends how you read the Bible - how critical you are. Remember, `critical thinking' in education classes? Many students could not think like that at first, but we changed, didn't we?

APPENDIX TWO: STAGE TWO INTERVIEW WITH DAVID

Q1. I want you to do two things: firstly give me a list of 10 animals that are significant to you (significant can be positive or negative); secondly brainstorm the ideas that arise when you think of each animal.

A1. Hyena What I know is that it is dangerous, and in rural areas is used by witches who send hyenas to kill people, or their hyenas can be trained to turn people into zombies by their howling. When you bury such a victim's body you are burying the hyena meanwhile the person himself has been taken by witchcraft. It is also an insult - if you are too `black' you are called a hyena.

Monkey They come around our homes to eat fruits when food is scarce on the mountain. People are not scared of monkeys but suspect that they are connected with witchcraft. Often monkeys are killed for this reason, I remember in 1992 a monkey was killed and it was believed that if the Nduna ate it then the village would be secure from witchcraft. The monkey was eaten by the Nduna's family, after that people were encouraged to eat monkeys. Now there are very few in our place, and I fear that our children will not know that animal. We will reach a situation where we will have to keep two monkeys safe in the zoo and go there to see them.

Animals hunted for food, such as rabbits and buck. There is a big problem in my village because many of these are killed. What is

happening is that the tribal authorities issued permits to go and hunt as many animals as you want. But then Nature Conservation came and said that these animals are good for the welfare of the society and required more permits. Then the people were critical and said "you want us to pay more money to kill wild animals, but that money will not go to creating more animals for hunting, these animals belong to us but you will fill your pockets". So people started to ignore those who tried to justify conservation. Even now it is very hard to justify respect for wild animals in our village.

Owls are also associated with witchcraft because they move at night. In fact an owl can be used by a witch e.g. if an owl cries near to your home then in the morning the family will go the Sangoma to find out the reason for the visitation. Generally it is believed that wild animals must stay away from human communities. If they come it is believed that someone has sent them. If you bring wild animals to your home it will be believed that you are a witch. During the disturbances of 1990 people were killed as witches. It is believed that humans can turn themselves into an animal - all this goes with superstition.

I am not sure how true that is. You see, I am very influenced by my community, I also have an experience where someone promised me that he can I feel these people have the powers and they can change themselves into animals. I don't know if this is also propaganda but it is said that Samora Machel could turn himself into a fly or a lion. In fact I understand that African magic does exist, people can control nature. We attended a magic session where a person took

off his ears. Are you scared by these stories? Our grandparents knew that sometimes a person could assume the character of the animal by which he was named e.g. Nyari is buffalo. Our late chief minister could turn himself into a snake. I believe that people can turn themselves into animals.

APPENDIX THREE: STAGE ONE INTERVIEW WITH CONNY

This is a preliminary conscientising discussion with a Tsonga speaking member of staff about the aims and implementation of the research, for example; how animals are likely to be viewed within that culture, the problems and possibilities likely to occur in cross-cultural communication between myself and the students in Stage 2 interviews.

Q1. I would like to discuss your ideas about how our students may think about animals.

A1. They would think of them as meat.

Q2. If I was a teacher in the Kruger Park and I was talking to a group of Tsonga-speaking students about the importance of animal conservation, and they were thinking of these animals as meat, wouldn't that make it difficult for us to understand each other?

A2. When it comes to the information you are teaching about the animals, you may have problems.

Q3. Can we explore other ways that people think about animals that may be different from the ways that conservationists think?

A3. We need to look at their culture, at where they come from, because when children go home from school their fathers may be

hunters and the fathers will have problems with what their children have learnt.

First of all there is fear amongst Africans of animals. Africans have never trusted an animal, even with dogs, when they see them they hit them. And with other animals that enmity is there. So that element of fear comes into the talk of conservation. Africans have never seen the reason to conserve animals, since they have lived with animals for a very long time.

Q4. Are all animals an object of fear?

A4. Not all. To a very little extent there is a desire to see them. Animals are understood as things to be seen, but people say "why should I go to the Kruger Park - I already know these animals?"

Q5. What about the use of animals in Muti?

A5. A crocodile's brain is used in Muti, some believe that it can be used by people to kill others. On the other hand cow dung can be used to heal wounds. [embarrassed reticence to continue with this topic.]

Each person has an animal within him e.g. a person with the name Nyati has a great respect for buffalo.

Q6. Is the connection between a person and an animal in name only, or is it in the soul?

A6. [Excited] Yes, when you are born you are told about your connection with an animal - in that way it enters your soul. That animal may not appear in your name, but it will be found somewhere in your praise name, which may be very long.

[Excited] On the question of birds, a Dove symbolises peace but an owl symbolises witchcraft. So if you tell pupils to respect an owl I think you will have problems because if an owl perches on your roof you will feel that you have been `visited' and you will need to see a Sangoma.

Q7. Is there any connection between animals and belief in gods?

A7. Yes, chickens and cows are slaughtered for ancestral worship but not animals of the veldt, only domestic animals.

Q8. Why is that?

A8. Because with wild animals there is the question of mistrust and enmity but people live with domestic animals and have a good relationship with them, they are highly valued, give meat and milk and are controllable. Our ancestors relied on domestic animals and such animals are part of the respect for ancestors. For example if my father dies, his heritage (livestock) passes to me and I respect them because they remind me of my father. If I sacrifice something (to my ancestors) it must be something that was passed on by them to me.

To get back to your point of teaching about conservation. What we need to explore are alternative methods for Environmental Educators to talk with people, to overcome the problem of seeing things differently e.g. an owl. You see, if educators say "we understand your culture so we are not going to say anything about an owl then those owls will be destroyed as enemies."

Q9. I think that is a very important point, I think it is the central question of my research. Can we come back to that in a further discussion?

Firstly I need to find out in what ways our college students `see things differently'. Can I ask you the question I hope to ask the students?

A10. Yes.

Q11. Could you list 10 animals that are significant to you?

A11. You mean domestic and wild animals?

Q12. That is the question, that is all! Significance can be positive or negative.

A12. Cattle we use them for fun meat and milk.

A pig is also significant for me.

A lion I would like to see it at the game reserve but if it is at my place then it must be destroyed. I got this idea from my parents and I don't tire of listening to their stories. From them I learnt that a lion is very dangerous and I regard it as an enemy.

Q13. I forgot to ask you to give a descriptor to describe the dominant idea associated with each animal.

A13. O.K. a lion is dangerous.

The fourth animal is a crocodile, I was told that I must be careful of them and learnt tricks to escape them. Also there is the problem of a crock's brain as already indicated.

A hare Africans have so many stories of hares. My word for hare is `intelligent'. Most of the things we learnt as children were from hare stories.

An elephant, the word is `boss'. It is not so dangerous, good things are associated with it since it is not cruel. It can defend weaker animals from dangerous ones.

A hippo. I lived next to a river, we went to see the hippo as a child. I was told if you want to see a hippo just take a red cloth. I learnt these things from the villagers - like a hippo cannot jump. To me a hippo is neither positive or negative. I know it is a bit dangerous.

Leopard, if I look at it then I'm gone.

Q14. What is the word associated with it?

A14. It is not so dangerous but I shouldn't look at it.

Buffalo, I like it because it has courage, it can fight with a pride of lions on its own.

Q15. Well that is the list of 10 animals, its interesting you have not mentioned humans, birds, fish, insects, frogs, lizards etc. Do you regard them as animals?

A15. No I don't. I know in biology we say humans are animals but when Africans refer to humans as animals it is different. For example an African is called a `dog' if he does not behave in a good way. Once he is called such a thing he will become very angry. Another insult is `baboon', but the names Matebula and Baloyi are connected to 'baboon' thus when you praise such a person you may say "hey, your tail will never be straight" and he will say "you know me" and he will be very happy because you have used his name in the right way.

Q16. And what about birds?

A16. Strictly speaking we do not regard them as animals.

Q17. So how do you define an animal?

A17. It is a four legged thing not two legged.

Q18. That means a frog is an animal?

A18. No it needs to be something big.

Q19. And a mouse?

A19. In Xitsonga we use 'little animal', which has a different meaning for frog and mouse.

Q20. If an animal is defined by 4 legs and large size, is a cold thing like a crocodile regarded as an animal?

A20. Yes.

Q21. What about insects?

A21. Locusts are used for food, there is a saying in Xitsonga 'that people in one family should share one locust' meaning that no matter how little you have you must share. Mosquitoes are dangerous but there is nothing further significant about them. I think we would rather regard mice as animals than insects.

Q22. What of other insects?

A22. Well, scorpions must be killed and there is a belief that if there is a spider on your wall when you sleep you might be shocked (like electrocuted) so that you may have bad dreams (bewitched) and not be able to wake up. This happened while I was at boarding school to a friend of mine.

Q23. Given what you have said about the limited definition of animal, would it be better to use a different word than animals e.g. 'creatures'? I mean when I interview the students.

A23. You would get a problem with 'creatures' because to a certain extent people regard creatures as insects.

Q24. Is there a Tsonga word collectively for all living things?

A24. Yes it's actually creatures. You may say 'swivumbiwa' which means all creatures in a literal sense but indicates 'all living things' excluding plants.

Q25. Does circumcision school have any influence on attitudes to the natural environment?

A25. In a way it has a connection with nature, although there is less emphasis on catching food in the veldt now.

Q26. Part of the purpose of circumcision school is passing on values. Are some of those values concerned with nature?

A26. Well the values cannot be told to anyone.(cautionary tone)

Q27. Yes I don't want to hear the values, but only whether some are concerned with nature?

A27. Yes to a certain extent.

Q28. I've never thought of that angle it could certainly contribute to different ways of seeing things if the teacher has not passed through circumcision school.

A28. Yes, it remains a secret lest you incur the wrath of whoever told the secrets. (laughter)

APPENDIX FOUR: THE MOST COMMONLY HELD IDEAS ATTACHED TO EACH ANIMAL, SUMMARISED FROM STAGE TWO INTERVIEWS

What animals are most frequently chosen? and What ideas are commonly held about these animals?

Lions. (9 mentions): Admired for its strength, bravery, cleverness and beauty. King of the jungle. Key part of food chain.

Elephant. (6 mentions): Strong, dangerous but not irresponsible. Cares for its young. Economically important.

Buck. (5 mentions): Food. Beauty.

Goat. (5 mentions): Food. Ritual sacrifices.

Cow. (5 mentions): Meat, milk, skins and labour.

Hares. (5 mentions): Clever. Food.

Dog. (4 mentions): Hunting and guarding. Brave and intelligent.

Cats. (4 mentions). Witchcraft. Useful at home to kill rats.

Owls. (3 mentions): Witchcraft.

Baboon. (3 mentions): Human-like. Witchcraft.

Snakes. (3 mentions): Dangerous. Useful to Sangoma.

Chickens. (3 mentions): Food. Ritual sacrifices.

Hippopotamus. (3 mentions): Dangerous. Food.

Pigs. (3 mentions): Edible but undesirable and dirty.

NB. 9 other animals were also mentioned once or twice.

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NOTES

NOTES A

Popkewitz (1984:35) echoed Habermas's ideas when proposing paradigms to explain "the competing definitions and assumptions about social enquiry". Popkewitz's description of the paradigm of the symbolic sciences provides the overarching context within which Habermas's practical interest operates. In this paradigm perceptions of reality are understood to be intersubjectively constituted and shared within a historical, political and social context.

NOTES B

In South Africa, a trend can be discerned where approaches to teaching and learning within a practical interest are forcing a shift from the traditional technical interest of Science (Levy quoted in Perold 1995:7). For example, in line with international developments in Science, Technology and Society courses (Aitkenhead 1994; Solomon 1994), interpretivist frameworks have been proposed for a new South African Science and Technology curriculum at secondary level (Perold 1995).

NOTES C

Fien (1993a) suggested that the problem of schooling can be understood in terms of orientations in education linked to Habermas' 'knowledge constitutive interests'. A Socially Critical orientation rests on an 'emancipatory interest', which combines

knowledge of how nature and society work and how we can become involved in changing structures and processes through individual and collective action. In this orientation, learning is viewed as socially constructed through an interplay of all participants' subjective views of the world and the historical and cultural frameworks in which they are located.

NOTES D

O'Loughlin (1992) proposed a comprehensive critique of Piagetian constructivism that set the stage for his social constructivist proposals; a socio-cultural model of teaching and learning mindful of the 'communalistic' (historical and cultural) context of learning.

Piagetian constructivist theories sought generalisable laws of learning. They had roots in a cognitive psychology, but emphasised learning as an internal process effected in a stage-related, mechanistic way.

O'Loughlin argued that although Piagetian constructivism challenges transmissive teaching approaches with an emphasis on the learner's own cognitive processes, it still works to objectify knowledge and promote individualism. This objectification, apparent in the concern with learning as a process of cognitive development leading progressively towards universal, rational and disembedded thought, can be seen at work in Decentration; the increasing ability of the child to bracket out real objects and deal only in mental images. Buck-Morss (cited in O'Loughlin, 1992) suggested that this process

acts to reify cognition because now the object appears to be an object of thought rather than socially produced. In other words the learner is separated from the historical and cultural constitution of her reality.

NOTES E

The idea of lifeworld describes our own individually and socially constructed reality: our orientation towards the world which helps us determine how we define our situation, the way we look at things, what we believe to be true, valuable and real (Wals 1995:156).

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NOTES D

O'Loughlin (1992) proposed a comprehensive critique of Piagetian constructivism that set the stage for his social constructivist proposals; a socio-cultural model of teaching and learning mindful of the 'communalistic' (historical and cultural) context of learning.

Piagetian constructivist theories sought generalisable laws of learning. They had roots in a cognitive psychology, but emphasised learning as an internal process effected in a stage-related, mechanistic way.

O'Loughlin argued that although Piagetian constructivism challenges transmissive teaching approaches with an emphasis on the learner's own cognitive processes, it still works to objectify knowledge and promote individualism. This objectification, apparent in the concern with learning as a process of cognitive development leading progressively towards universal, rational and disembedded thought, can be seen at work in Decentration; the increasing ability of the child to bracket out real objects and deal only in mental images. Buck-Morss (cited in O'Loughlin, 1992) suggested that this process

acts to reify cognition because now the object appears to be an object of thought rather than socially produced. In other words the learner is separated from the historical and cultural constitution of her reality.

NOTES E

The idea of lifeworld describes our own individually and socially constructed reality: our orientation towards the world which helps us determine how we define our situation, the way we look at things, what we believe to be true, valuable and real (Wals 1995:156).