RESEARCH PROJECTS PORTFOLIO

for

Masters in Education

(Environmental Education),

Rhodes University

by

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January 2000

Introduction

This collection of research projects tells a story of the time I have spent with members of the Albany Working for Water team; including preparations made, lessons learned and insights gained.

My first project was to analyse the methodology of a research paper. I chose the paper by Arjen Wals because I intended, like him, to examine people's perceptions of environmental issues. From this paper I gained ideas for a qualitative research process and learnt the importance of theoretical and methodological consistency.

My next project was to present a report on my research into the perceptions of work-related environmental issues among the Albany Working for Water workers. From this research I gained insight into the knowledge of the workers and also some of the misconceptions that they have about social and ecological issues. I made educational recommendations based on these insights.

This experience inspired me to initiate a play with a group of the workers about alien plant eradication. The process of developing this play formed the basis for a research paper that I have submitted as another research project.

Concurrent with the development of the play, I conducted a fourth research project that was a situational analysis of the Albany *Working for Water* Project. I hoped that this analysis would provide useful insight into the context of the above two projects.

Overall, I hope the story reflects how I have grown through the learning experiences I shared with the Albany Working for Water team. I would like to extend to my thanks to all those who assisted and shared my journey with me.

Contents

Analysing Social Science Research Traditions: A Study of the Paper: *Young Adolescents' Perceptions of Environmental Issues* (Arjen Wals)

Assignment 1 for Research Methodologies Module
Conducted in partial fulfilment of a
Masters in Education (Environmental Education),
Rhodes University

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A Brief Summary of the Paper to be Discussed

The paper discussed for this assignment reported on research of the perceptions of environmental issues of young people in the city of Detroit. Youths from both inner-city and suburban schools were interviewed and observed in the classroom situation, with the object of understanding how they perceived environmental issues. This research was intended to help environmental educators interpret their own situations through dialectic interaction with the paper. The paper is attached as Appendix A.

Overview of the Discussion

In this paper I explore Wals's (1992) research with respect to methods used, knowledge interests, interpretations of meaning and the importance of values. I aim to determine whether the research fits most comfortably within the interpretivist or critical paradigm. Many inconsistencies are found between the theory and the practice in the research, thus positioning the study theoretically within the critical paradigm and practically within the interpretivist paradigm. The aptness of Wals's choice to position himself within the action research tradition is questioned, followed by a discussion of some potentials and limitations of the interpretivist and critical paradigms in the context of Wals's study.

Introduction

Wals explicitly positions his research 'in the traditions of action research and phenomenology' (p.47). Phenomenology is a school of thought of the interpretivist paradigm (Cohen & Manion, 1994), while action research can be considered to be a method or - as Wals sees it - a tradition and can be implemented in many different ways depending on the philosophies and principles that underpin it. McKernan (1991) describes scientific, practical and critical/emancipatory types of action research. Action research is often associated with critical theory and the critical theorists, Kemmis and Carr, are among the researchers that Wals draws on with respect to action research (p.48). Thus between interpretivism and critical research, it was initially difficult to pinpoint Wals's research orientation.

Cantrell (1993:84) noted that

> In general, interpretivism and critical science share many tenets in common, with one marked difference. The former focuses primarily on understanding and interpretation and the latter on emancipation and critique of ideologies.

In the assignment that follows it should unfold that it is this precise difference that positions Wals's research most comfortably within the interpretivist tradition.

Knowledge Interests

Grundy (1987) described three types of knowledge interests: technical, practical and emancipatory identified by the German philosopher, Jurgen Habermas. The fact that Wals wants students to intervene *themselves* in their own situations to effect change by 'transform[ing] their lives through their education' (p.46) locates him theoretically within Habermas's 'emancipatory interest' (the interest which generates critical theory - Grundy, 1987:18). Fien & Hillcoat (1996:27) explained that the critical research paradigm has an 'explicit political emphasis'. There were theoretical elements of the critical tradition in the philosophical assumptions underlying Wals's research. His study had a political element to it with his call for students in the inner city to 'transform their lives through their education' and for 'social and environmental change' (p.46). Also Wals demonstrated a concern for equity when he explained that his

reason for placing schools from the poorest neighbourhoods at the centre of his study was that people from these areas are more exposed to environmental threats while at the same time receiving very little environmental education or education for change (p.46). Grundy (1987:19): described the emancipatory interest as concerned with the 'ability of individuals and groups to take control of their own lives in autonomous and responsible ways' arising from 'critical insights into the social construction of human society'. Wals's research did not reflect the emancipatory interest fully because pupils did not engage in such social critique, nor were they enabled to make changes in their lives.

Grundy (1987:13) described the practical interest as 'an interest in understanding the environment so that one is able to interact with it'. The questions driving Wals's study (p.46-47) are aimed at *understanding* the way young people define their own situation so as to interact with these young people and their understandings, and improve environmental education projects. Also, in his introduction Wals identifies a 'need for contextual development of environmental education'(p.45). Grundy (1987:13) associated the practical interest with interpretive sciences and thus with respect to knowledge interests, Wals's study fits best within the interpretive paradigm.

Reality as a Social Construct

Within both the interpretivist and critical paradigms, reality is believed to be constructed through human interaction. Schwandt (in Fien & Hillcoat, 1996:27), when describing the interpretivist understanding of reality stated that:

> The world of lived reality and situation-specific meanings ... is thought to be constructed by social actors. That is, particular actors, at particular times, fashion meaning out of events and phenomena through prolonged, complex processes of social interaction involving history, language and action.

Popkewitz (1984:41) also described symbolic or interpretivist research as giving attention to how people define expectations of appropriate behaviour through 'interactions and negotiations in social situations'. Robottom et al (1993, in Fien & Hillcoat, 1996:28) described critical research as a means to 'develop a conception of reality that ties ideas, thought and language to social and historical conditions'.

Wals acknowledged the subjectivity of researchers when he said that

> researchers have a consciousness, world view and language ... that are a product of the history of ideas, social and cultural development and their individual encounters with the world (p.47).

Given the time dedicated to the socio-economic context in the research, it would seem evident that he believed that these issues shape the consciousness of the research participants as well. He dedicated a section (pp.49-50) to descriptions of the schools, the students and the communities.

This included descriptions of socio-economic conditions of the neighbourhood, race, the physical setting of the school; and social problems such as drugs, violence and teen pregnancy.

The difference between the critical and interpretivist paradigms with respect to the social construction of reality is how researchers use their understandings of making meaning. Kincheloe (1991:147) said that phenomenology is 'an attempt to grasp a sense of the meaning that others ascribe to their own lived worlds'. Thus, phenomenology provides a description of many 'meanings' that different individuals make of their worlds. These meanings are accepted and portrayed as such by the researcher (Janse van Rensburg, pers. comm.). Yet for critical researchers there is a need to move beyond this understanding of meaning to questioning the power relations and ideological forces which influence such meaning making (Kincheloe, 1991) and to look for a 'true' meaning or reality (Janse van Rensburg, pers, comm.). Wals's discussion (pp.50-52) is consistent with his claim that his research is phenomenological as he does not question students' perceptions (meaning making), but instead only describes and categorises.

The Role of Values in the Study

Lather (1996) described critical research as openly and explicitly ideological, while texts describing phenomenology emphasise the importance of the neutral researcher (Van der Mescht, 1996 and Fien & Hillcoat, 1996) where values are acknowledged and set aside - not made known or discussed with research participants. In theory Wals took a critical approach when he stated that researchers should 'minimise the constraints of preconceptions by recognizing and making explicit one's own preconceptions, biases and prejudices in relation to the subject and participants' (p.47). Also he drew on Paulo Freire, a noted critical theorist, to support his claim that 'it is not our role to speak to people about our own view of the world or to impose this view on them, but rather to dialogue with the people about their view and ours' (p.46). Yet, the actual research is more phenomenological in nature because Wals makes no reference to dialogue between himself and students, nor does he make explicit his own values in the paper.

A Qualitative Study

McKernan (1991:7) said that the qualitative researcher 'allows the data to emerge on their own without any preconceived theories or forced structures imposed on the study, and looks for meaning in the events'. This is consistent with Wals's analysis of his data as he explicitly said that he began with no preconceived hypotheses (p.47) and had 'several rounds of interpreting' while subjecting these interpretations to 'constant modification' (p.48).

Although both critical and interpretive paradigms use qualitative research, it is the specific methods that Wals used in his research that indicate that his research was phenomenological. The techniques of in-

depth interviews and participant observations that Wals used are commonly used methods for phenomenological research (Cohen & Manion, 1994).

An Action Research Study?

When Wals positioned his research within the traditions of action research and phenomenology he noted that

> within these traditions [without distinguishing between the two] one tries to make sense of an ongoing process that may go in many directions - making initial observations, developing tentative general conclusions that suggest particular types of observations, making those observations and thereby revising one's conclusions, and so forth (p.47).

Wals referenced Lewin, Carr and Kemmis when he likened this process to the research spiral found in action research. Yet, in its execution, Wals's research did not reflect the essential features of action research as described by these researchers.

McKernan (1991: 32-33) listed 16 key principles and concepts common to all types of action research. I will go through the relevant principles (these are underlined) systematically to try to establish whether Wals's research can be considered to be action research as it is described by McKernan.

The first two principles are: action research aims to increase human understanding and action research is based on a concern to improve quality of human action and practice. Carr & Kemmis (1986) supported this when they described the essential aims of action research as to improve both understanding of practice and practice itself, as well as to improve the situation in which the practice takes place. It seems that it is these needs that drove Wals's research, as he expressed a concern that environmental educators have little understanding of students' perceptions of the environment and environmental issues (p.45). Yet, there is no evidence that the aims to improve practice and the situation in which practice takes place were achieved by the end of the research.

McKernan's principles that the focus of action research is on problems of immediate concern to practitioners and that action research should be a collaborative community of discourse between insiders and outsiders (including 'all stakeholders') raise the question of whether Wals was an insider or an outsider in his research. One could argue that Wals was an insider in the community of environmental educators, but I do not believe that this is what McKernan meant by an insider. Wals explained that he works on environmental education projects in the Detroit metropolitan area, but did not specify that the four schools that he researched are schools where he has personally experienced this problem of a 'lack of understanding of students' perceptions' (p.45). Assuming that these are not schools with which Wals

normally works, he is neither an insider, nor a practitioner in the actual schools that he investigates. It seems that important 'insiders' and 'stakeholders' who were omitted from this research are the school teachers who are also involved in the implementation of environmental education projects and who must play a role in students' perceptions of the environment.

Another key principle described by McKernan is that action research should be participatory in nature: that 'those affected participate in the research and implementation of preferred solutions'. (See also Carr & Kemmis, 1986.) Teachers were not involved in the research at all. Students involved in the research seem to have been involved too passively in the research (that is being observed and as interviewees) for the research to be considered participatory.

The next principle is that action research should focus on the case or single unit. In Wals's study, he seems to have conducted more of a survey, covering four schools and interviewing students until he reached a 'theoretical saturation point' (p.48).

McKernan's next principle is that there should be no attempt to control setting variables. Wals's research is consistent with this principle as he specifically noted that the aim of the research was not to establish causal relationships between inner city or suburban young adolescents' perceptions of environmental issues (p.55).

It is doubtful whether Wals's description of his research as active and reflective corresponds with McKernan's next principle that action research should include an evaluative-reflective spiral. It seems that Wals considered the method of 'observation' (p.48) and the data analysis through 'interpretation' (p.48) to be action and he reflected on this through 'revising conclusions' and 'suggesting further observations'. Carr & Kemmis (1986:167-174) described action and reflection of a very different kind in a number of case studies. Here actions for solving identified problems are carried out in the classroom while teaching and are not distinct from teaching. Data from these experiences are then reflected on and actions revised.

Wals's research was scientific in that he stated problems, planned data collection and analysed results. McKernan's description of scientific research called for the formulation and reformulation of 'action hypotheses' that Wals did not do as his research did not include an action component in the sense that it is intended here.

There is also the issue of shareability and utility; McKernan suggested that the results should be 'shared among the participants'. In Wals's paper he gave no indication that he did this although he called for 'dialectic interacting between the reader and the author' (p. 48). This brings us to the next

principle that says the research should be of a dialogue/discourse-based nature. There may be dialogue between Wals and the reader, and there may have been dialogue between participants during the classroom observations, but Wals gives no indication that there was dialogue (only in-depth interviews) between himself and participants. McKernan (p.31) describes discourse as the 'central data of action research'.

The last two principles mentioned by McKernan are that action research should be critical ('grounded in social practice') and can be emancipatory. Paraphrasing Marx, Popkewitz (1984:45) said that the function of critical theory is to 'change the world, not describe it'. Kemmis's (1998:7) description of critical social or educational science as: 'directed towards action and taking action', supported this. But as discussed under the section 'Knowledge Interests', Wals's research is only critical in theory and not in practice - there is no action that leads to an improvement in the situation of poorer schools or to students transforming their lives.

Thus, considering the understandings of action research of Lewin, Carr, Kemmis and McKernan, I do not believe that Wals's research featured enough of the suggested principles of action research to call it 'same'.

Potential and Limitations of these Research Traditions

The research did not directly lead to the social change which it proposed (that of students transforming their lives through education), nor did it lead to an improvement in the situation of poorer communities who receive little environmental education or education for change. If action research had been carried out in a more participatory and collaborative way with teachers and learners, these problems could have been addressed. Just through the researeh, poorer communities could have experienced environmental education! The Deakin model of the action research process is 'critical of positivist and critieal-interpretive theories so far as they are passive - seeking to explain and not linked with human action' McKernan (1991: 25). Goodman (1992:121) believes that a shortcoming of some phenomenological research is that 'if the focus remains on the subjective consciousness of the actors, no means remain for distinguishing between what *seems* to be the case for the actor and what *is* the case'. Wals's research did not cover what 'the case is' with the students he worked with as he never challenged their 'mini-theories' or 'misconceptions'. In theory, though, he did see his research as a platform for exploring these 'misconceptions' or 'mini theories' with the aim of conceptual change (p.53) and some important ground work was conducted to initiate dialogue amongst educators. Another important aspect of the research was that it led to an understanding on the part of the researcher that inspired useful recommendations (pp.53,55) for dealing with environmental issues.

Conclusion

It is evident that Wals is influenced by critical theory as he draws on the critical theorists Freire, Kemmis and Carr. Thus it was tempting to try and locate the research within the critical paradigm. Elements of critical research were evident in theory, but one of the most important aspects of critical research, that is, action that leads to emancipation and a critique of ideologies, was not part of the research. Nor could it be said that Wals's research was consistent with current understandings of action research. With regard to knowledge interests, the focus on an understanding of meaning, the fact that values were not made explicit, and methods of observation and in-depth interviews; Wals fitted comfortably within the interpretivist tradition. Thus the actual implementation of the research was consistent with the tradition of phenomenology within which Wals positioned himself.

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Personal Communication

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Appendix A

Young Adolescents' Perceptions of Environmental Issues: Implications for Environmental Education in Urban Settings

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Justification, background and method

Constructivist approaches of learning

Despite good intentions, many environmental education (EE) projects seem to fall short in realising ambitious learning goals such as "helping citizens become environmentally knowledgeable, skilled and dedicated people who are willing to work individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between the quality of life and the quality of the environment." (Harvey cited in Hungerford et al., 1980). Without always challenging the nature and content of these goals, many researchers and practitioners are trying to resolve this discrepancy between the theory and practice of EE. Some have tried to instrumentally structure EE content matter by using hierarchical levels of universal goals and objectives (e.g. Hungerford et al., 1980; Marcinkowski, 1990) whereas others who question the value or the status of universal goals and objectives, have put emphasis on contextual development of EE within the school community (e.g. Bull et al., 1988; Robottom, 1987). However, relatively little attention has been paid to the way young people come to make sense of their own environment through their everyday interactions with(in) the lifeworld.[1]

For more than fifty years constructivist approaches to learning have suggested that the pre-instructional perceptions (also referred to as "mini-theories" and "misconceptions") of the learner play a key role in successful learning or lack thereof (Ausubel, 1968; Driver and Oldham, 1986; Freyberg and Osborne, 1981; Gilbert and Watts, 1983; Hasweh, 1986; Novak and Gowin, 1984, Wals, 1987) Yet, unlike the English teacher who is very capable of determining at what "level" her students are, environmental educators have little understanding of students' perceptions of the environment and environmental issues, and the "mini-theories" to which they lead.

The need for contextual development of EE

While working on environmental education projects in the Detroit metropolitan area[2] it became clear to me that our -- that of the university facilitators -- understanding of education in general and environmental education in particular, was very different from that of the people with whom we worked. It was striking to discover that we knew very little about the way the students from the city of Detroit experience their world and perceive the role of

education in a so-called "inner-city" environment.[3] Paulo Freire once suggested that it is not our role to speak to people about our own view of the world or to attempt to impose that view on them, but rather to dialogue with the people about their view and ours. Their view of the world, manifested in their actions, reflects their situation in the world. "Educational and political action which is not critically aware of this situation runs the risk either of banking or of preaching in the desert." (Freire, 1986; 85).

If we do not adapt schooling to the context in which it takes place, students in the inner-city will not get the chance to transform their lives through their education. On the contrary avoiding to do so will reinforce the status quo of their situation. If environmental education is not only education *about* and *in* the environment, but also -- and perhaps foremost -- education *for* the environment, then it is inevitably education for change. Education for social and environmental change requires an understanding of the way people "define" their own situation. Hence, it is important to become critically aware of the way people perceive their world. Ideally, through their education, students learn to interpret their situation as requiring intervention, especially their own intervention. If it is important to build upon students' preconceived notions, "naive" ideas and their experiences with the environment, then it is crucial to find out what these notions, ideas and experiences are.

Environmental education for the disadvantaged

An important reason for putting children from some of the poorest neighbourhoods in the city of Detroit on the centre stage of this study flows out of research that supports the claim that many African-Americans and working-class people live in areas that are more directly exposed to environmental threats (McCaul, 1976; West, 1989; Russel, 1989; Bullard, 1983; Bryant and Mohai, 1992). I contend that those who are most directly exposed to environmental threats -- whether it is because of race, class or both -- are also the ones who receive very little environmental education or education for change. If this is true, then environmental education constitutes an elitist form of education that serves those who have the luxury (money, time, community support, and resources) to spend time to resolve environmental issues.

If the change component of environmental education is ignored, for whatever reason, then environmental education projects inevitably fall short in helping students understand the roots of inequality and environmental deterioration. In order to move beyond the symptoms of environmental problems, we need to get better insight in how students, particularly those who live in depressed areas, perceive their environment.

Questions driving the study

Bearing in mind the context of the EE projects I participated in, the following questions made up the guiding framework of the research: What do students from urban middle schools see as "environmental problems"? What kind of

relationship do they see between themselves and these problems? How do the different physical and social environments of middle school students, influence the perceptions of their environment? How can environmental education projects better build upon students' perceptions and be true to the contextual differences that can be found within the different school communities?

Research as a subjective enterprise

Human ideas, experiences, and intentions are not objective things like molecules and atoms. Nevertheless many educational researchers attempt to use "objective" methods that allow for the control, predictability and "generalisability" needed to uncover the "laws" or "patterns" that guide human behavior and the "systems" in which that behavior occurs. The scientific method constructed to do this, has long been claimed to be a value free tool of inquiry that can be used to objectively study an objectifiable world.

An alternative way to approach social scientific research is to regard all knowledge to be subjective. Subjective not as the opposite of objective but, rather in the sense that knowledge finds its origin in a "subject" that is at the core of a world which is [partly] shared with other "subjects". (Margadant-van Arcken, 1989). Human science can not exclude the knowledge of the inquirer from an understanding of how knowledge is generated. Researchers have a consciousness, world view and language as well that are a product of the history of ideas, social and cultural development and their individual encounters with the world. Much like reading a good novel, what we bring to the text [research] is as important as the text [research] itself (Smith, 1985). Many so-called qualitative research traditions acknowledge this by maintaining that the immediate subjective experience is the basis of knowledge.

Hence, a challenge in human research is to minimise the constraints of preconceptions by recognizing and making explicit one's own preconceptions, biases and prejudices in relation to the subject and the participants. It is not until then when another's experience can be communicated in a relatively undistorted fashion. From this vantage point there is a conscious effort on the part of the researcher to come to share participants' perspectives without using a theoretical model to judge these perspectives (Roche, 1973; Spiegelberg, 1972, 1975; Van Manen, 1975; Beekman, 1984). I therefore neither tested hypotheses nor used observation matrices. This does not mean that "theory" did not play a role; existing theories re-emerged after the data had been collected.

Phenomenology and action research

The research approach used here fits best in the traditions of action research and phenomenology which require the researcher to take the role of observer, interpreter and participant. In researching education within these traditions, one continuously tries to make sense of an ongoing process that may go in many directions--making initial observations, developing tentative general

conclusions that suggest particular types of further observations, making those observations and thereby revising one's conclusions, and so forth. This "research spiral" is very similar to the spiral of action and reflection the learner ideally follows in an action research project (Lewin, 1946; Kemmis, 1980; Carr and Kemmis, 1986; Wals et al., 1990).

I not only engaged in participant observation, but I also interviewed students and kept a research journal. The majority of the research findings reported here resulted from thirty in-depth interviews with students from the four schools. The interview transcripts, classroom observations and journal entries were analyzed and compared with the intention to discover some structure and coherency in the reflections. After several rounds of interpreting, a deep-structure of common themes emerged. The writing process itself became the making sense of data. Throughout the writing process the interpretations were subject to constant modification as a result of confrontations with the rough data themselves and feedback from a panel of reviewers.

Non-random sampling and generalisability

Within this type of investigation it is more important to have good informants who are capable of providing insightful information than to have a statistically representative group of people obtained through random sampling. Nevertheless, it is important to have some strategy in mind when selecting students in order to get the most out of relatively short interviews. The strategy used was based upon Glaser and Strauss' "theoretical sampling design" which is a compromise between pragmatic sampling and probability sampling (Glaser and Strauss, 1967). This is an open sampling design in that you only stop interviewing informants when you feel you have reached the "theoretical saturation point." This is the point where patterns seem to repeat themselves and the interviews don't seem to reveal anything new anymore (Agar, 1980).

The findings that emerge from this study are only transferable to other settings when the act of generalising is viewed as a process of dialectic interacting between the reader and the author. This process requires the reader to relate the findings of a study to his or her own experiences. At the same time it requires the author to present the findings as subject to interpretation, adaptation and rejection. This approach differs from the "what research says" approach which tends to be more prescriptive. What one learns about one student's or a small group of students' thinking about environmental issues, for instance, can raise one's consciousness of features that *might* be found among other students. This study does not pretend that other students will share identical or even similar features but rather that these are features one might look for among other students. Philosophically speaking, one cannot generalise from one situation to another when the situations are identical, only when they are different (Eisner, 1991).

The research setting and participants

The schools and their communities

Thirty students, age 12-13, from four middle schools located in the Detroit metropolitan area were the central focus of the study. Because of the importance of context in qualitative studies, much space in the actual research report is devoted to describing the different schools and students (Wals, 1991). At the risk of doing some injustice to the schools and the students, I will provide a brief description of the schools, the students and their communities.

The four schools represent a range of different student populations, communities and physical locations. Socio-economically, the continuum stretches from the upper-class families who send their children to a private school, via the middle- and working-class families at the other suburban school to the working-class and the "out-of-work" class families in the two Detroit schools. One of the Detroit schools is located in one of the poorest neighbourhoods of the city. Racially the continuum shifts from the virtually all white schools in the two suburbs to the virtually all African-American schools in Detroit.

Physically the school buildings and their locations differ as well. On the one extreme there is the private school which is located in a park-like setting on the banks of the Rouge River, and on the other extreme there is one of the Detroit schools which can be regarded as bunker in an urban war zone. The organisational structures and the curriculum of the schools appear to be the same, but the problems that permeate the neighbourhoods in the Detroit schools force these schools to focus on safety issues, and to teach a double curriculum which in essence includes performing many tasks which ordinarily are considered to be the tasks of parents and/or guardians. Additionally, budget constraints, lack of equipment a perceived need to teach students the basic subjects, before they drop out of school, make for a far more limited curriculum in the Detroit schools.

The students

When looking at the Detroit students' descriptions of their world, we see a dynamic world full of contrasts and extremes. On the one hand many of the students find themselves fortunate; they live on a relatively nice block, have some parental guidance, are not involved in drugs and are still in school. On the other hand they find themselves in a community that is almost saturated with often drug-related problems such as street violence, teen pregnancy and, what they regard as, a failing justice system. To cope with the violence in their community they have developed a variety of survival strategies: they know what to do when they hear gun shots, are able to suppress their emotions and to ignore parts of their reality, know how not to draw attention to themselves when alone in public, know what places to avoid, spend a lot of time indoors -- often using the outdoors exclusively to get from one place to another -- and

they have developed their own dreams and fantasies which provide a mental shelter (Wals, 1991).

School is important to many of the city students interviewed, but not for school learning which appears to be mostly irrelevant. Instead, school performs many other functions for them; it brings some stability to their lives, it provides a shelter in a troubled neighbourhood, it is a place where groups of students can socialise -- something which they can hardly do outside -- and, finally, it provides the education needed, if not to fulfill their dreams, then at least to keep them out of the cycle of drugs, gangs and violence. So, even though many students criticise some of the content of the subjects they are taught and the way some teachers teach, they still value school. They are definitely at an advantage compared to their peers who already have left school.

The students from the north suburban schools have different concerns and a physical environment that is more inviting than that of the Detroit students. Unlike the Detroit students in this study, many of the suburban students have not been deprived of a basic right of childhood --the right to experience and explore the world around them safely, spontaneously, and on their own terms (Berg and Medrich, 1980). Their lives are not influenced existentially by neighbourhood crime, violence and drugs, although these problems can be found in their communities as well.

Physically, the surroundings of the suburban students are different from those of the Detroit students, but more noticeable than the physical differences -- although less bright and green, the Detroit students also have parks, back yards and play grounds in their neighborhood -- are the social differences that determine the degree to which the physical surroundings are used and the extent to which they form an integral part of the community and the lives of the children. For various reasons, many of the suburban students have been able to leave their own neighbourhoods to visit other places either with school, friends or family, while many of the Detroit students have hardly ever left the city.

In summary, we have a mosaic of different contexts with overlapping elements which makes it difficult, if not impossible, to pinpoint any causal relationship between any one variable and possible differences and similarities among the students. In keeping with the research approach described earlier, it is assumed that the context as a whole influences the way students interpret and make sense of their experiences and not any one element or variable in isolation.

Perceptions of environmental issues

The analysis of the qualitative data revealed that all students in the study, regardless of the very different context they come from, are concerned about "classic" environmental issues, but think about these issues differently. Three distinct ways of thinking about pollution and environmental problems emerged.

I. The personalistic view

Pollution can be touched, smelled, tasted and seen. Once it can no longer be sensed, pollution is no longer a threat to our health. People contribute to pollution directly when they litter, put garbage in the garbage can without closing the lid properly, when they do not keep up their lawn -- even when they cough without putting their hand in front of their mouth. Pollution is mostly a local problem and does not have the ability to spread out to far away places. Out-of-sight is out-of-mind, in the eyes of these students. The effects of pollution are immediate upon impact and are mostly a concern for humans and not for other animals or plants.

Environmental problems are mostly physical problems that are a direct result of our own individual polluting behavior which is subject to our own individual control. Environmental problems are not viewed as problems of human nature or as cultural problems. Solutions to pollution are found in changing our own "polluting behavior" (e.g. stop littering) and helping "clean up" polluted areas (e.g. pick up litter).

II. The technocratic view

Pollution cannot always be detected by our senses for it can be present without being noticed. Pollution can spread to far-away places via water and air, and poses a threat to humans and other species on a global scale. Pollution accumulates over time and does not disappear when it is out of sight. There are many indirect ways, e.g. using electricity, in which people contribute to pollution. Pollution is an inevitable result of the way we live. Students are able to talk about specific global environmental problems such as acid rain, ozone depletion, and global warming, but have only a fragmented understanding of these issues which makes it difficult for them to distinguish one from another. While talking about these global issues, students use words such as habitat, ecosystem, carbon-dioxide, "fluoro-carbons," and biodegradation, without comprehending their meaning. Students seem to think that environmental issues have the potential to destroy all life on earth. Industry symbolises an inevitable evil: the price we pay for our modern lifestyles. By developing new technologies that filter pollution from water and air, it may be possible to have both industry and a clean environment. Students do not challenge the presence of industry or our lifestyles, and emphasise cooperation between people along with technological solutions as the proper responses to addressing environmental problems. Environmental problems are not seen as problems of human nature or as cultural problems. Nevertheless, there appears to be a broader notion of pollution and the students' expressions of their concerns is more coherent or less disparate.

III. The politicised view

Pollution manifests itself in many visible and non-visible forms and does so on

a global scale. Students see environmental issues as global issues and link pollution problems to rapid population growth. When discussing global environmental problems, students display a coherent understanding of problems such as acid rain, ozone depletion and global warming, and are able to distinguish them from each other. Students are able to see current pollution problems in a historical context as products of the evolution of rural and tribal forms of living toward the modern society we live in today. It is suggested that earlier societies did not have pollution problems. Pollution is seen as the result of our modern industrial society that people themselves have shaped by their decisions, actions and values.

Students see environmental problems not as natural occurring phenomena without any possible form of ethical control, nor as mainly technological problems, but instead as politicised problems: problems of conflicting interests, choices and values. They suggest that in addition to exploring new technologies, we change our lifestyles to accommodate reducing, re-using and recycling. They hint at the idea of "limits to growth" when suggesting that we should show constraint in taking advantage of the perks of a modern society. Students also suggest that the interests of industrialists contradict environmental interests. Environmental issues become political issues. People can send a message to industry by boycotting polluting products. Not surprisingly, none of the students consider the unequal distribution of wealth and natural resources as possible contributors to global environmental problems.

These three perspectives of pollution and environmental issues (Table I) can be found in all four schools with the technocratic view point being the most frequent one, followed in descending order by the personalistic view and the politicised view. Some students adhere to different perspectives depending on the topic of discussion. There is a hierarchy in the three perspectives. As one moves from the personalistic perspective to the politicised perspective, students' level of knowledge and understanding becomes more sophisticated; the pieces of information are less disparate and their thinking becomes more holistic; they become better able to see local issues as the local manifestations of global problems, and finally, they develop a greater propensity to view environmental problems as problems that lie within ourselves.

Again, all three perspectives can be found in all four schools, but the personalistic perspective is more prevalent in the two Detroit schools while the politicised perspective is more prevalent in the two north suburban schools. The technocratic perspective is dominant in all schools. These findings conflict with those of other studies which suggest that there is one coherent view that develops with a certain age or grade level (Rejeski, 1982; Brody, 1991).

Concluding remarks

* It should be expected that within the same classroom, different conceptions of pollution and environmental issues can be found. When teachers engage in

a process of questioning and probing dialogue with the students, perceptions of environmental issues can be elicited. The dissonance that may result from the different ways of looking at environmental issues may lead to better understanding. The role of conflict and confrontation between different ways of looking at the world in ascribing new meaning or re-interpreting to existing concepts or ideas should be explored further.

* All students in this study in one way or another are concerned about pollution, regardless of the context in which they grow up. This is particularly noteworthy when looking at the Detroit students and the challenging circumstances they find themselves in. In addition to their concern with monumental social problems in their community, they are also concerned about classic environmental problems such as acid rain, the atmospheric greenhouse effect and destruction of the rain forests. There is definitely an interest among students in learning more about these issues.

* Many students appear to have so called "misconceptions" about certain environmental issues. Some of these alternative conceptions emerge from their interpretation of cause and effect relationships (e.g. acid rain damages your car), some stem from their evaluation of the seriousness of certain forms of pollution (e.g. the exaggeration of the effect of visible organic and the underestimation of non-visible pollution), and some emerge from the relationship they see between environmental issues (e.g. equating the hole in the ozone layer with the atmospheric greenhouse effect). These are only a few of the so-called misconceptions that emerged from the interviews. We have to be careful with judging these misconceptions. In fact, the word misconception may be inappropriate given that it refers to an alternative interpretation of a phenomenon that is valid in light of the students' own experiences. It is hard to deny, for instance, that acid rain damages your car or your hair. It appears that any environmental education program that wishes to address an environmental issue should explore any potential "misconceptions" or "mini-theories" students might have regarding these issues. There is a wide body of research that shows that many people, even in light of contradictory information, tend to hold on to conceptions that flow out of their own experiences (Snyder and Swann, 1978; Lord et al. 1979; Hasweh, 1986). Conceptual change can occur in a non-threatening, non-condescending and non-judgmental learning environment that will allow students to arrive at a new position through exploration and investigation, in cooperation with their peers.

* How can we teach about environmental issues without overloading students with complexity and the feeling of being overwhelmed that surrounds pollution and environmental issues? The argument that young adolescents should not be burdened with adults' problems can be rejected. This study clearly shows that young adults *are* already burdened with these problems. Not providing them

Table I Young Adolescents' (12-13) Perceptions of Pollution and Environmental Issues (source: Wals, 1991)

	LEVEL I: Personalistic View	LEVEL II: Technocratic View	LEVEL III: Politicized View
Qualities Attributed to Pollution	Pollution has apparent physical qualities: it can be seen, smelled, touched and tasted. If it cannot be sensed in any way then pollution is not present and therefore not a problem. Students only identify point-source pollution. Environmental problems are physical problems.	Pollution can also be present and pose a health threat when it cannot be sensed. Pollution can move around through rivers, water and soil, and can accumulate. Students only refer to point-source pollution, including cars. Environmental problems are technical problems.	Pollution manifests itself in many visible and non-visible forms on a global scale. Pollution is seen as a cancer that keeps growing out of control. Students recognize both point and non-point pollution. Environmental problems are problems of human nature and the choices people make.
Perceived Causes	People create waste as a by-product of their existence, but they have no place to put it so they just dump it in a river or throw it on the ground. Some examples: not closing the lid on the garbage can, coughing without covering your mouth, using a barbecue and not keeping up the lawn.	Pollution is the result of people's individual "polluting" behavior (driving a car, generating garbage and littering) and the by product of industrial processes (air and water pollution). Students display knowledge of indirect causes of pollution: e.g. using electricity.	A combination of rapid population growth and the price we pay for the transition from a rural/tribal society to a modern industrialized society. In essence pollution is the result of our own decisions, values and actions. A conflict of interest between economy and a clean environment.
Perceived Effects	People and, to a lesser degree, animals will get sick when they have direct contact with pollutants: e.g. breathing in thick smoke and drinking "dirty" water. Effects are acute and immediate. Polluted areas can be unsafe areas to visit; the people who hang out there can be dangerous. Students have little or know understanding of concepts such as; "bio-degradable," "ecosystem," and "global environmental issues."	Eventually we will have no place to put our garbage. Chemicals can kill people, animals and trees. Smoke and chemicals in the air can lead to a hole in the ozone layer, the greenhouse effect and acid rain. No clear understanding of how these issues related or what they mean other than that they are all bad. Students have heard of concepts like "habitat," "ecosystem," and "bio-degradable," but don't really know what they mean.	No more landfill space to put our garbage which will lead to more incineration which pollutes the air. Global environmental problems such as; acid rain, atmospheric greenhouse effects, rainforest destruction, and the hole in the Ozone layer. Students display a coherent understanding of these issues and are able to distinguish them, Effects can also be chronic. Students have some understanding of complex concepts such as "ecosystem" and biodegradable."
Perceived Solutions	Pollution can be avoided since it is a physical problem over which we have control: stop throwing things on the ground, help "clean up," keep your own yard clean, close the garbage can, burry waste in a landfill and cover it to avoid the smell and the rats. Use smokestacks to get smoke out of the factories, away from people.	Pollution is inevitable, but can be limited by being less wasteful, recycling more, planting lots of trees to counter air pollution, and using technology, e.g. filters to clean water and air, incineration to burn waste. People need to cooperate in countering pollution.	Pollution is inevitable but can be curbed by taking technological measures, such as using alternative energy and fuel efficient cars, using legislation to curb industrial pollution, changing personal behavior, e.g. recycling and boycotting certain products, and, finally, changing our lifestyle, e.g. using public transportation.

with an opportunity to deal with their concerns seems unfair. There are ways to keep students from getting bogged down or disillusioned by these issues. Schools could focus on manageable local issues of the students' interest. In finding a local solution a class could spiral outwards to other parts of the world where similar issues have been dealt with. Students should be given opportunities to create solutions by themselves in cooperation with community resources. Finally, the role of success stories in countering feelings of hopelessness and helplessness should be considered as well.

Notes

1 The word "lifeworld" is derived from the German "Lebenswelt" and is used to describe our own individual 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. In short: the kind of world we create for ourselves.

2 I) The Action Research and Community Problem Solving (AR&CPS) project developed by the University of Michigan's School of Natural Resources after an educational exchange with Deakin University (Australia). For a discussion see Wals et al., 1990.

II) The Rouge River Interactive Water Quality Monitoring Program for Schools. In this project, schools located in the same watershed monitor the quality of their river from upstream to downstream in a coordinated, joint program which in interdisciplinary fashion addresses the physical, biochemical, social and political aspects of water quality (Mitchell and Stapp, 1991). The Rouge River project is linked to its spin-off projects and other water monitoring programs from around the world through the Global Rivers Environmental Education Network (GREEN).

3 The terms innercity and suburbs are used somewhat simplistically for convenience bearing in mind the following. The associations I had of *innercity*, at least prior to working there, were: "black," "poor," "working class," "poor education," "garbage filled open spaces," "closed stores," "unsafe," "high crime," "grey," "dirty alleys," "no trees," etc., whereas the associations I had with *suburb* were almost the opposite; "white," "middle class," "better education," "clean parks," "active shopping malls," "safe," "low crime," "broad lawns," etc. Stereotypes like these color our perceptions, easily distorting reality since in either environment associations of both kind can be found. The research aim of this study was not to establish a causal relationship between "innercity" or "suburb" and young adolescents' perceptions of nature or of environmental issues, however tempting that may be.

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Situational Analysis of the Albany *Working for Water* Project

Conducted in partial fulfilment of the Masters in Education (Environmental Education), Rhodes University

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December 1999

Acknowledgements

I would like to thank Andrew Knipe of the Albany *Working for Water* Project and Peter Ellis of MBB Consulting Engineers for contributing their knowledge about Albany *Working for Water* towards this research. Lil Haigh of the Rhodes University Institute for Water Research, and Kevin Bates of the Grahamstown Transitional Local Council Parks and Forests Department, thanks for clarifying aspects of *Working for Water* for me during my telephonic 'interrogations'.

Also thanks to Eureta, your comments and suggestions are always of tremendous worth.

1. Introduction

The aim of this assignment is to present a situational analysis of the Albany *Working for Water* (*WFW*) project. I chose Albany *WFW* as the subject of my study for two reasons. Firstly, I conducted two research projects required for my Masters in Education with Albany *WFW*, and I hope that this study will give background insight into the context of these projects. Secondly, I hope to identify issues of relevance to my own work to which I need to respond in future environmental education interactions with Albany *WFW*.

The Albany *WFW* Project is part of the National *WFW* Programme. *WFW* is a programme of the National Water Conservation Campaign (NWCC), which the Department of Water Affairs and Forestry (DWAF) launched in 1995 to promote sustainability and equity in water supply (DWAF, 1996). The programme is responsible for the removal of alien plants in South Africa's water catchments, and potentially has major ecological and socio-economic implications for South Africa. Alien plants consume large quantities of water (DWAF, 1996) and impact negatively on watercourses and biodiversity in South Africa. The removal of alien vegetation on often uneven, difficult-to-access terrain and the subsequent follow-up herbicide spraying is a labour intensive process. *WFW* provides employment for many people, thus contributing to another of its goals, which is to develop the economic and social conditions of the most marginalised sectors of South African society (MBB Consulting Engineers, 1999).

The Albany *WFW* team is presently working in the Kowie River catchment area. In the past the Albany *WFW* has been responsible for clearing the catchments of the Kariega and Bloukrans Rivers as well as areas of the Sunshine Coast, but no longer does so due to budget cuts.

Initially the Albany *WFW* project started out as a 'trading account project'. Such projects receive an annual budget from DWAF. Presently the Albany project has been re-classified as a 'poverty relief project'. Central government provides poverty relief money intermittently when it is available, which means that management cannot plan too far in advance and workers are insecure about their employment. The finances to support the project are from the government's Poverty Relief Fund which channels the finances for the project through DWAF. When Albany *WFW* was a trading account project, before budget cuts, it received regular financial support directly from DWAF (Powell, pers. comm. 1998).

2. Methods

Data for this situational analysis was gathered through document analysis, semi-structured interviews and informal discussions with present and past management staff of *WFW*. The documents analysed included a regional implementation strategy produced by MBB Consulting Engineers (the management agent for the Eastern Cape *WFW* projects), the 1997/98 *WFW* annual report, and publicity and other

information documents produced by DWAF, NWCC and *WFW*. I approached the semi-structured interviews in a manner best described by Robson (1993). That is, where the 'interviewer has worked out a set of questions in advance, but is free to modify their order based on ... what seems most appropriate in the context of the conversation' (Robson, 1993:245). These semi-structured interviews were conducted with the current Albany *WFW* project manager, Andrew Knipe, and with a partner of MBB Consulting Engineers, Peter Ellis. I covered questions relating to ecological, socio-economic (including a focus on educational) and political dimensions of *WFW*.

Data from interviews and relevant documents were summarised into categories and are described and discussed below. These categories reflect how Albany *WFW* affects and is affected by the socio-economic, political, biophysical and educational situation of its area of operation.

3. Findings and Discussion

3.1. Ecological Aspects of *WFW*

3.1.2. Ecological Benefits? A Need for Research

According to DWAF (1998) the removal of exotic plants will be of great benefit to ecological systems. It will lead to improved water quality; healthier, more productive rivers, wetlands, estuaries and groundwater tables; less erosion, scouring of rivers and siltation of dams; and conserved biodiversity. The project aims to improve assurance of water supply for all South Africans. It is widely believed that alien plants use more water than our local plants and trees (*WFW*, 1996). Mr Knipe would like to establish how Albany *WFW* is affecting the water supplies in the district. Unfortunately, there are insufficient funds for commissioning scientists to do the research, but it is encouraging to hear that, after clearing an area, workers have seen physical evidence of springs running where they previously had not (Schudel, 1999a).

3.1.2. Water Resource Demands

The Albany *WFW* Project is not expected to benefit Grahamstown with respect to increasing water supplies in the various holding dams, but is expected to benefit settlements in the Kowie Catchment downstream from Grahamstown, notably Port Alfred (Knipe). The water demands of Port Alfred are expected to exceed the resources in 2010 (MBB Consulting Engineers, 1999). So, if the removal of alien plants does indeed increase water supplies in the Kowie Catchment, this will be of benefit to a needy district.

3.1.3. Financial Constraints on Ecological Benefits

A national survey of alien plant infestation in South Africa showed that the 1997/1998 level of funding for *WFW* (R275 million) supported a level of clearing which would not prevent a slight increase in the total area invaded by alien plants (*WFW*, 1998). A twenty-year clearing strategy was proposed at an increased

R600 million per year, which would reduce the alien invasion to minimal levels and require only follow-up costs (*WFW*, 1998). Unfortunately the budget for *WFW* projects has since been cut rather than increased (Knipe). This raises the question of whether *WFW* will be able to reduce the area invaded by alien plants and whether it will be able to meet three out of its six primary objectives. These are to 'enhance water security', 'restore agricultural capacity and security' and 'improve the ecological integrity of our natural systems' (MBB Consulting Engineers, 1999). Although the government has to make many difficult decisions concerning the allocation of funds, the importance of water security should not be underestimated. MBB Consulting Engineers (1999) list 26 East Cape water supply systems where demand is exceeding supply and predict water shortages for 17 other schemes in the near future. In response to water shortages, South Africa has (at great financial cost) supported the Lesotho Highlands Water Project - a series of large dams destined to supply the Pretoria-Witwatersrand-Vereeniging Area. Yet, large dams are known to have a limited life-span and to result in a range of biophysical and social problems such as the destruction of downstream ecosystems, the displacement of people, the spread of diseases and food shortages (Davies & Day, 1986; Shiva, 1988; Coleman, 1995; Goldenberg, 1999). *WFW* can offer no accurate estimates or guarantees of the volume of water that it could produce compared to the Lesotho Highlands Water Project. Yet, the proposed *WFW* budget of R600 million per year for twenty years can be put into perspective when compared to the US$8 billion (largely provided by the World Bank) for the Lesotho Highlands Water Project (Coleman, 1995).

WFW does have other funding options such as the government's poverty relief fund, municipal organisations, private business and foreign donors (DWAF, 1998) which may be able to make up for the cut in funding from DWAF. In his 1999\2000 budget speech, Trevor Manuel reported an allocation of R1 billion to the poverty relief fund, but did not indicate how much of that would be allocated to *WFW* (Manuel, 1999). In Albany *WFW*'s case, poverty relief funds have enabled the project to keep going, but only at a reduced capacity. MBB Consulting Engineers (1999) estimated the area in which Albany *WFW* operates to have a percentage of alien plant invasion of 1.1 – 5.0 percent. With their previous number of teams Albany *WFW* were removing alien vegetation in nature reserves such as Waters Meeting. Having had to reduce the number of teams, the Albany project is now only able to clear aliens in a very limited area - the Grahamstown commonage. This leaves large tracts of private and nature reserve land infested with alien vegetation, which could seed and re-infest cleared areas. One encouraging development is that negotiations between Albany *WFW* and the Grahamstown Transitional Local Council (TLC) indicate that if Albany's funds were to run dry, the TLC would execute follow-up clearing on the commonage by employing contractors trained by Albany *WFW* (Knipe).

3.2. Socio-Economic Aspects of Albany *WFW*

3.2.1. Poverty

Mr Knipe says that the TLC, in selecting people for *WFW* jobs, has given preference to single heads of households, long-term unemployed and persons who support multiple families. He believes that the Albany project is playing an important role with respect to the reduction of crime and poverty in Grahamstown (see also Schudel, 1999a). A proposal has been submitted by the Institute for Social and Economic Research (Rhodes University) to gauge the socio-economic impact of *WFW* in the Albany district but, due to budget constraints, it has not been approved (Knipe).

3.2.2. The Institutional and Social Development Policy

The national *WFW* Programme has a policy for Institutional and Social Development (ISD). Integral to this policy is the establishment of Project Steering Committees (PSCs) and the support of emerging contractors (see below) as well as the presentation of programmes to the workers on various social and development issues (see 3.4.2). With the assistance of MBB, the Eastern Cape *WFW* is in the process of developing an ISD policy specific to the region with a focus on the sustainable development of the Eastern Cape and with 'specific attention to the rural poor' (MBB Consulting Engineers, 1999:27).

PSCs are comprised of members of the local community who act in an advisory capacity for *WFW* on issues such as funding and public relations (Knipe). The Albany *WFW* PSC represents various groups such as scientists, the Masiphakamisane Women's Group, the Department of Health, the Department of Agriculture, Nature Conservation, the TLC and the African National Congress whose members report back to their respective organisations.

Presently the Albany project uses a closed contract system where an emerging contractor is temporarily assisted by DWAF. DWAF provides equipment, maintenance, administrative and financial management support and the contractor quotes on providing the labour (MBB Consulting Engineers, 1999). The project trains the emerging contractors to become independent contractors who will then work in an open contract system. In the open contract system, contractors will be able to tender for other contracts such as maintaining and clearing roads (Knipe). Mr Ellis envisages that it will take about four or five years for emerging contractors to successfully 'graduate' to the open contract system. During this time the emerging contractors need to be regularly monitored and evaluated to establish whether they can become independent contractors.

3.2.3. Limitations of a Poverty Relief Project

MBB Consulting Engineers (1999) note that the change from the closed to an open contract system is only possible for the trading account projects, fearing that the process will fail if it is expedited without the necessary training and monitoring. Projects that rely on intermittent poverty relief funding cannot provide on-going support to their emerging contractors.

Mr Ellis notes that any institutional and social development needs to be consistent. This is not possible for poverty relief projects that operate on a stop\start basis as funding allows. In an attempt to address this problem of discontinuity, MBB Consulting Engineers (1999:27) recommend that an ISD programme be developed for all projects implemented by government in the respective districts of the Eastern Cape. MBB Consulting Engineers (1999) envisage that the District Councils could implement the programme and that government departments could monitor and evaluate its effectiveness for their respective projects. Such a programme would ensure ongoing development of the people so that 'capacity [could] be built in a constructive manner' (MBB Consulting Engineers, 1999:27).

3.2.4. The Recuperation of Costs

MBB Consulting Engineers (1999) maintain that projects that entail alien clearing in a major metropolis should be expected to recoup costs incurred to the project such as through the implementation of a block tariff system to water supplies. Mr Ellis explained that *WFW* Projects were expected to act as catalysts for development and that partnerships were expected to develop between *WFW*, district councils and TLC's for supporting the *WFW* Projects. The Port Elizabeth district council for example raised R4 million for the project that was then supplemented by R5 million from *WFW* itself (Ellis). The Grahamstown TLC has made contributions to the NWCC, for example, R250 000 in the 1998/1999 financial year. This funding was used for improving water reticulation in Grahamstown, and for Learning to Value Water - an educational project under the NWCC umbrella (Haigh, 1999). Although the TLC has not made direct financial contributions to Albany *WFW*, partnerships have developed between the two for the clearing of council land. While *WFW* has cleared council land (during the 1999/2000 financial year), there has been close collaboration between the Parks and Forests Department of the TLC and Albany *WFW*. During the initial clearing of council land, *WFW* manually clears the land, this is followed by a burning programme funded by Parks and Forests with labour provided either by Parks and Forests or by *WFW*. *WFW* then follows with one or two chemical sprays. Thereafter, Parks and Forests is contractually obliged to continue clearing the land for the following five years. Parks and Forests has also contributed to the landscaping and reseeding of land cleared by *WFW* (Bates, 1999).

3.2.5. Secondary Industries

MBB Consulting Engineers recommend that projects should support secondary industries that have a 'significant multiplier effect'. In their implementation document, MBB (1999:30) state that it is important that 'any [secondary industry] venture embarked upon is profit based' in order to generate funding and ensure the sustainability of the project. *WFW* encourages the removal of wood by donkey cart owners as that improves their access to the cleared areas for follow-up spraying. This is a significant contribution by *WFW* with respect to their objective to 'maximise the social benefits that are possible as a community based public works programme' (MBB Consulting Engineers, 1999:3), yet it does not meet the above-mentioned criterion of contributing financially to the sustainability of the project. Mr Knipe mentioned two possible secondary industries for Albany *WFW*. One is the initiative undertaken by Jonathon Pryor to make furniture from felled eucalyptus trees and another is sending wattle to Richards Bay for the pulping industry. But Mr Knipe says that the Albany project is experiencing problems in this regard. Firstly, the fluctuating prices for wood pulp make the pulping option not particularly viable. Secondly, while potential entrepreneurs come forward with ideas, and receive encouragement by management to make a sample, they have yet to follow-up those ideas. He says that it is the responsibility of management to support potential entrepreneurs, but that the latter must show the initiative. He believes that there is not enough entrepreneurial spirit in Grahamstown.

Considering this and also the fact that to 'engage in entrepreneurial activities' is one of the specific outcomes for economic and management sciences for Curriculum 2005 (Pretorius, 1998), it may be worthwhile including entrepreneurship in future environmental education or other training programmes. A component could perhaps be included in an environmental education module, which would draw on the entrepreneurial ideas of workers, discuss other possibilities and enable them to act on these ideas.

3.3. Equality and Transformation

WFW aims to enhance the quality of life of the most marginalised people of South Africa: the poor, the disabled, the youth, rural communities and women (*WFW* Programme, 1998:3; MBB, 1999). National *WFW* policy requires that the workforce comprises 65% women and 25% youth. Mr Knipe says that currently Albany *WFW*'s workforce comprises 50% women and 34% youth. Although the required 65% women has not been reached, the project has given women the opportunity to take on the jobs that have traditionally been allocated to men. They are given the opportunity to become production controllers, contractors and drivers. Albany *WFW* used to have a team working in Port Alfred made up of disabled people, but that division was closed down to budgetary constraints (Knipe).

3.4. Education and Training

3.4.1. Technical, and Contract and Development Training

At Albany *WFW*, a distinction is made between two types of training. The first is technical work-related training, which includes chainsaw and brushcutter operation, herbicide application and storeman and mechanics courses. The other is contract and management development that includes business skills; safety; and government policy such as the Labour Relations, Occupational Safety and Health, and Income Tax Acts (Knipe). Mr Knipe notes that most of Albany *WFW*'s resources have been focused on training the contractors because of limited funds. For 1999, team building, computer skills and herbicide courses were planned.

3.4.2. Courses on Social and Development Issues

Different organisations and government departments have been co-opted to present courses on social and development issues to workers. For example, the Department of Health has spent two hours per week focusing on issues such as AIDS awareness, substance abuse, and sexual and reproductive health. FAMSA is focusing on violence, rape, how to get a court interdict and how to get maintenance for children (Knipe).

Other educational programmes that have been presented to workers include literacy and personal finance.

3.4.3. Environmental Education

There has been limited environmental education in the Albany *WFW* Project to date. There has been a two-day programme at the Thomas Baines Education Centre and a group of workers have been involved in the development of a drama about the issue of alien plant eradication (Schudel, 1999b). There have also been initiatives by staff such as the 'Bundu Bashers' outing organised by Jonathon Pryor for the 1999 Science Festival. During this outing visitors were invited to join workers who showed them how to plant indigenous trees. Although this was not termed environmental education, I believe that education can take place through sharing of knowledge and dialogue with others (Schudel, 1999b). The project has an induction course for new workers run by the production controllers where issues such as littering, pollution and smoking in the field are addressed. Workers are also told about alien trees, what they do to the soil and why they are being removed (Knipe).

If I were to run another environmental education course for *WFW*, I would like to design activities that encourage discussion about the links between the biophysical, social, economic and political aspects of environmental issues. The need to recognise the complexity of environmental issues is highlighted by O'Donoghue (1993; see also Lotz, 1999 and Schudel, 1999a). Some approaches to health education

include factors such as 'legal, fiscal, societal, cultural, economic and environmental dimensions' (Robottom & Colquhoun, 1992). Thus there is a possibility that environmental education could be included in modules presented by the Department of Health, if the latter are broad enough.

3.4.4. Education and Training Limitations

Because of budget constraints as well as the lack of staff and expertise, the Albany project is largely dependent on government departments and other organisations to present courses. Thus they are not always able to offer all the courses they would like to provide for workers (Knipe).

MBB Consulting Engineers (1999) said that 'a combination of information, funding, institutional capacity and natural resources is required' for the eradication of poverty. Also, Peter Ellis expresses concern about the 'stop-start' nature of the Albany project saying 'If you want to empower people, you need to provide them with information on a continuous basis'. This call for ongoing education is an important point consistent with principles for environmental education developed at the Tbilisi Inter-Governmental Conference on Environmental Education, which state that environmental education should be a life-long process (UNESCO-UNEP, 1978). Because environmental education programmes are ideally ongoing, the intermittent funding provided for Albany *WFW* could make programmes, such as the environmental education programme described above, difficult to implement. I have already experienced the difficulties of implementing an education programme during a time of insecurity at Albany *WFW* (Schudel, 1999b).

Although the need for information cannot be disputed, it is important for environmental education and other social development programmes to acknowledge that education should not be limited to methods that primarily convey information. Courtney-Hall (1998) warned against emphasising transmission of knowledge in education (see also Bowers, 1998 and Smith, 1998). Schudel (1999a) makes recommendations for alternative participatory learning methods or processes that foster critical thinking and problem-solving skills.

4. Conclusion

This analysis has highlighted the *potential* of Albany *WFW* to address ecological problems such as predicted water shortages, and socio-economic problems such as crime and poverty in the Albany district through the eradication of alien plants. The reduction of funds for the National *WFW* Programme has severely impeded its ability to significantly reduce the area covered by alien plants. Albany *WFW* has had to drastically reduce the number of teams involved in alien clearing. Thus, it is questionable whether the National *WFW* Programme is able to sustain one of its primary functions, which is effecting water security in South Africa.

Mr Knipe believes that Albany *WFW* has succeeded in reducing crime and poverty in Grahamstown and has had success with its establishment of PSCs and support of emerging contractors. The project has also successfully provided employment opportunities for women and youth. Yet, because of intermittent and insecure funding, Albany *WFW* is unlikely to be able to meet the socio-economic objectives of the national programme in a sustainable way. Trading account projects with secure funding may still be able to improve socio-economic conditions through ongoing support for emerging contractors and a consistent ISD programme. Through this, they would be addressing two of *WFW*'s primary objectives, namely to maximise the social and economic benefits of the programme (MBB Consulting Engineers, 1999). But, as a 'poverty relief' project, Albany *WFW* would be hard-pressed to do more than address the symptoms of poverty. The word 'relief' elicits no higher expectations.

Considering the above, there is clearly a need for further research on both ecological and socio-economic aspects of Albany *WFW*.

Education and training for the workers at Albany *WFW* has been extensive, with the provision of technical as well as contract and management training. Other educational programmes have included literacy, personal finance, and education about sexual and domestic violence. The workers have been involved in a few environmental education initiatives. Ideally these environmental education initiatives should be expanded and programmes could be developed that draw on participatory learning methods that foster critical thinking and problem solving skills to effectively address the complexity of environmental issues as well as issues of sustainability in relation to workers' livelihoods. While bearing in mind the above-mentioned constraints of a poverty relief project, it seems that there is room for a formal environmental education programme, which should include modules such as entrepreneurship and health. Albany *WFW* is very short of funding, therefore the project would be dependent on such an environmental education programme being presented by government departments such as the Department of Economic Affairs Environment and Tourism (possibly represented by Thomas Baines Education Centre) with the possibility of combining efforts with other departments such as the Department of Health.

Raising funds from district councils and TLCs, and the generation of funds through profit-based secondary industries are two ways that have been suggested for improving the financial security of Albany *WFW*. These ideas have not been successfully implemented at Albany WWF. This is due to market-related problems, a perceived lack of entrepreneurship amongst Grahamstonians and the difficulty of fund-raising.

It would seem that there is a need to examine the role of the *WFW* programme either as a reconstruction and development project or as a financially self-sustaining institution based on economic rationalism. Ideally the programme should be able to contribute sustainably to the socio-economic development of the poor as well as to contribute effectively to water security in South Africa. Ultimately, either as a welfare - or financially independent institution, *WFW* (both nationally and locally) needs to assess whether it needs to aim for socio-economic sustainability and effective ecological improvement of the environment and, if so, how it might meet this aim.

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Perceptions of Work-related Environmental Issues among Albany *Working for Water* Workers: Educational Implications

Report conducted in partial fulfilment of the Masters in Education (Environmental Education), Rhodes University

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December 1999

Acknowledgements

I would like to extend my thanks to the *Working for Water* workers for their participation in focus group discussions and interviews. I loved working with a group that showed such enthusiasm and interest.

Thank you also to Yvette du Preez of MBB Consulting Engineers, and previous project managers of Albany *Working for Water*, Mike Powell and Sidwell Dingela, for taking the time to read this document and for your useful comments.

Eureta thanks for your valuable advice and for your continued enthusiasm through the many drafts of this document.

Executive Summary

This report is based on research conducted by the Thomas Baines Education Centre to explore the perceptions of work-related environmental issues of workers in the *Working for Water* (*WFW*) Project of the Albany district. The research aims to provide guidelines for follow-up educational programmes for Albany *WFW* by Thomas Baines staff, education programmes at other *WFW* projects, and for educators developing materials for Adult Basic Education and Training (ABET) programmes.

The researcher ran four two-day environmental education courses for teams of *WFW* workers at the Thomas Baines Education Centre. Data was generated during interviews and focus group discussions with workers attending the courses, and from mimes performed and pictures drawn by participants during the courses.

The results illustrate workers' perceptions of ecological, socio-economic and educational aspects of *WFW*, the effects of *WFW* on their lives personally and financially and on water supplies in Grahamstown. Some of the key issues emerging are: a need for sensitivity to potentials and limitations of different educational and linguistic abilities among workers, misconceptions among workers about work-related social and ecological processes, and a desire among workers to be both teachers and learners.

The report highlights a number of environmental issues that could be included in an education module for *WFW* to encourage critical debate and foundational competence amongst workers. Recommendations are also made for including nutrient recycling and water cycles in an educational module as well as for nurturing an appreciation of biodiversity. The report also encourages the support of opportunities for workers to improve their food security and engage in entrepreneurial activities.

The report recommends encouraging the interest among workers for sharing their knowledge with others by including them in educational initiatives. The report highlights a few cases of reflexive competence among workers and recommends that education modules be developed which encourage such competence. Finally, possibilities for further research are suggested.

Table of Contents

1. Introduction

1.1. The Working for Water Project

Working for Water (*WFW*) is a national programme involved in the clearing of invasive alien plants in water catchment areas. *WFW* is a project of the National Water Conservation Campaign (NWCC) which was launched by the Department of Water Affairs and Forestry (DWAF) in 1995 to promote sustainability and equity in water supply (DWAF, 1996a; MBB Consulting Engineers, 1999). The removal of alien plants is a labour intensive process and *WFW* aims to alleviate poverty by creating employment and providing training opportunities with an emphasis on women, youth and the disabled (DWAF, date unknown).

WFW originally consisted of 38 projects operating throughout the country. The number of areas in which alien removal has taken place has extended to over 200 with the addition of funds from the Central Government's Poverty Relief Fund.

1.2. The Albany *Working for Water* Project

The Albany *WFW* Project is one of the original projects. It has been running since February 1997 in the Albany/Bathurst District of the Eastern Cape. Initially the project consisted of up to 15 teams of about 30 people each. Funding from DWAF through a trading account was supplemented by poverty relief funding. At present the project has drastically reduced its number of employees as it no longer receives trading account funding and exists solely on poverty relief money.

1.3. The Thomas Baines Education Centre's Role in the Albany Project's Educational Component

As part of the WFW training commitment, the Albany WFW management team has organised job orientated technical courses such as chainsaw operation, first aid and herbicide application; and social/life skills courses such as literacy, reproductive health education, and financial management for its workers (Schudel 1999).

WFW approached us at the Thomas Baines Education Centre, situated in the Thomas Baines Nature Reserve, to design an environmental education programme for the workers. There is one education officer at the centre, myself. I run environmental education courses for groups with the assistance of a field ranger. In response, I designed a two day environmental education programme for four groups of workers from the Albany *WFW* project. During each course we considered the issue of alien plant eradication from a number of perspectives. We addressed biophysical aspects of the issue such as catchment conservation, rehabilitation of disturbed areas, ecological functioning of a system, biodiversity, and how job creation has affected the Grahamstown community socio-economically.

1.4. Other Programmes which are Part of the National Water Conservation Campaign

It should be noted that there are two other projects, which have associated education programmes focusing on water in the Grahamstown community. These are the *Learning to Value Water* Project run by Lil Haigh of the Rhodes University Institute for Water Research, and the '20/20 Vision of Water in South African Schools' project. These projects are part of the NWCC's community awareness and education campaign and focus primarily on water quantity, water conservation, and in the case of *Learning to Value Water*, on conveying the message that we should pay for water services (Haigh, pers. comm., 1999). Although I did no extensive study of the content of these programmes, I thought it was important to be aware of programmes that might have influenced workers' perceptions of environmental issues.

1.5. The Research Aim

It was during the above-mentioned courses that I conducted the research reported here. The aim of the research was to explore the perceptions of *WFW* workers of the interlinked socio-economic and biophysical environmental issues related to the *WFW* project. I was not commissioned to do this research but chose to do so both because of my interest in adult education, and to inform the development of future environmental education programmes with *WFW*, something that I had been asked to do. Influenced by a constructivist approach to teaching where one builds on the knowledge of learners (Bodner, 1986 and Wals, 1992), I hoped that the research would give me an impression of the range, depth, and scope of the interest in and understanding of work-related environmental issues on the part of the workers. From this I intended to make recommendations for the broad content of follow-up environmental education courses, as well as teaching and learning methods for such courses. In my situational analysis of *WFW* I noted the limited environmental education to which workers had been exposed (Schudel, 1999). I hope that this report will encourage *WFW* management to consider a stronger environmental education emphasis in the future. I realise that the findings from this study can not necessarily be generalized as the case is not representative of *WFW* projects across the country, but I believe that the report may provide useful guidelines for other educators

- wanting to provide training modules for other *WFW* districts;
- developing materials for Adult Basic Education and Training programmes such as literacy programmes which could include water, alien plant invasive or biodiversity-related themes;
- involved in other projects of the NWCC such as the *Learning to Value Water* Project and 20/20 Vision.

2. Research Methodology

2.1. Opportunities Used

As mentioned above, I conducted my research during the environmental education courses that I presented to the *WFW* workers. I began the course by asking participants[1] questions to elicit responses that illustrated what workers considered to be relevant work-related environmental issues and how they perceived these issues. These responses came out of focus groups and interviews, drawings and mimes (see 2.2). Participants were made aware of my intentions with the various activities and agreed for me to record the interviews, mimes and focus groups.

I tried to choose activities that were effective both educationally, and in generating data to benefit future environmental education courses run with *WFW* workers. For example, the activity where the workers were asked to draw a picture about how *WFW* affects their lives served as an icebreaker aimed at putting participants at ease. Secondly, this activity provided an opportunity for workers to clarify some of their own understandings about *WFW* as well as to gain new understandings through discussions and comparisons with the drawings of others. Thirdly, the activity provided data that I could analyse through this study for the improvement and development of further courses.

2.2. Data Collection and Triangulation

As the research informants were Xhosa speaking with a limited command (if any) of English, I involved interpreters who were either field rangers from Thomas Baines Nature Reserve or the foremen of the *WFW* teams. For this reason, I was concerned about the validity of the data generated and I therefore made use of triangulation as described by Cantrell (1993) and collected data in three ways:

- Through individual drawings and interviews
- Through focus groups
- Through mimes

2.2.1. Drawings and Interviews

We started each two-day course by introducing the *Parks and Neighbours - Enviro-Picture-Building Game* (O'Donoghue, date unknown) as a stimulus for the picture drawing and drama activities. After the game, participants were asked to draw their own picture of how the *WFW* Project had affected their lives. I circulated during this activity asking questions about what was being drawn. The picture drawing was aimed at raising environmental issues related to the *WFW* project. The interviews enabled me to clarify what some of the drawings meant and to gain an understanding of the depth and scope of the workers' insight into these issues. The unstructured interviews I used here are best described by

[1] When the workers are referred to as participants in this document, it implies participants in the environmental education course rather than participants in the research.

Robson (1993) as the interviewer having a general interest of concern and letting the conversation develop in this area, and characterized by Cohen and Manion (1994) as having flexibility and freedom around sequencing and wording of questions. With the first *WFW* course I held group discussions about the pictures being drawn (about six people in a group). For the following three courses, I decided to interview participants individually about their drawings in order to triangulate data from both the individual and group perspective. The latter perspective was obtained from the focus group discussions described below.

2.2.2. Focus Groups

During each course the participants were divided into four groups and we had a focus group discussion amongst each group. Kitzinger (1994) distinguishes focus groups from group interviews in that group interactions are also used as research data in the former. As Kitzinger suggested, I conducted the focus groups attempting to keep a balance between minimal intervention and encouraging debate to maximise interaction.

Foich-Lyon and Trost (1981) suggest that a discussion guide be prepared for the focus group session. This guide is not seen as a formal questionnaire, but contains topics that will be discussed although not in any particular order. Although the role of the researcher is to keep the discussion focussed, Foich-Lyon and Trost (1981) suggest that unexpected topics raised during the discussion should be followed up as they may make valuable contributions to the research. The discussion guide, which I used, is attached as Appendix A.

2.2.3. Mime

Initially I hoped to use image theatre to allow workers an alternative means of expressing themselves. Image theatre entails asking participants to form an image with their bodies which shows 'a collective perspective on a given theme' (Boal, 1992:2). Being inexperienced in drama education and with having to have the activity translated, I struggled to convey the idea. The workers performed a mime for me instead and I decided to continue with mime rather than image theatre in subsequent workshops. In their groups, workers were asked to illustrate through image theatre/mime why *WFW* is important. The groups performed their mimes, the rest of the participants discussed what they saw, and then the groups had a chance to describe what they were trying to put across. The process was videotaped. This activity had the same aims as the picture drawing, but provided a different medium for workers to raise environmental issues related to the *WFW* project.

2.3. Methodological Problems Encountered

2.3.1. Limitations of Using Drawings as an Educational / Research Tool

A few participants seemed intimidated by the request to draw. Although I stressed that I was not expecting anything artistic or beautiful, one participant simply drew an apple, and another kept giving her paper to someone else to draw for her while I was not looking. This participant told me that she had never drawn anything before. It is here that the triangulation of data was particularly useful, as these participants were able to participate in the mime activity to convey the relevant information.

2.3.2. Interaction and Communication

Unfortunately the focus groups did not generate much group interaction. I believe that translation during interviews results in two factors that limit interaction. Firstly, translation tends to stilt free flowing discussion; and secondly, a translator, not being able to remember the exact words of a sudden flurry of debate between a number of people, tends to pick out the key ideas to interpret the debate (if he/she is a good translator), or might only translate the concluding remarks. Unfortunately, I did not have a professional translator and ideally I should have had a better quality tape recorder which could record a group more clearly for checking the interpretation later. The tape recorder that I used recorded only the interpreter and myself clearly, as we were sitting next to it.

I tried to generate a relaxed atmosphere during the focus group discussions. I had a circular seating arrangement and explained to the participants that the interview was not to 'test' their knowledge but to help me to establish what they already knew so as to improve materials development for use in training programmes. Also, I started each interview with easy, relaxed questions. Yet, I found a number of individuals still shy and reticent during the interviews. I found that those who were shy and reticent were usually women and those who had limited formal schooling. It could be that the questions I raised during the focus groups were intimidating and were reminiscent of an intimidating classroom situation. There is also the possibility that a question I asked about participants' level of schooling, was a threatening question. Ironically, my initial reason for asking the question was because it was an easy one to answer - it was intentionally non-threatening. Later I realised that the question would also generate interesting data for my research.

In spite of the limited group interaction and the limited participation by certain members of the group, I still found focus groups a useful research tool. The groups helped to reduce (if not negate) the intimidation that an interviewee might feel during an individual interview. The flexible discussion guide enabled me to focus and expand on interesting topics when they were raised. Also the unstructured nature of the focus group allowed for unexpected issues such as confessions of past criminal activity (Table 6) to be raised.

2.3.3. Translating Scientific Concepts

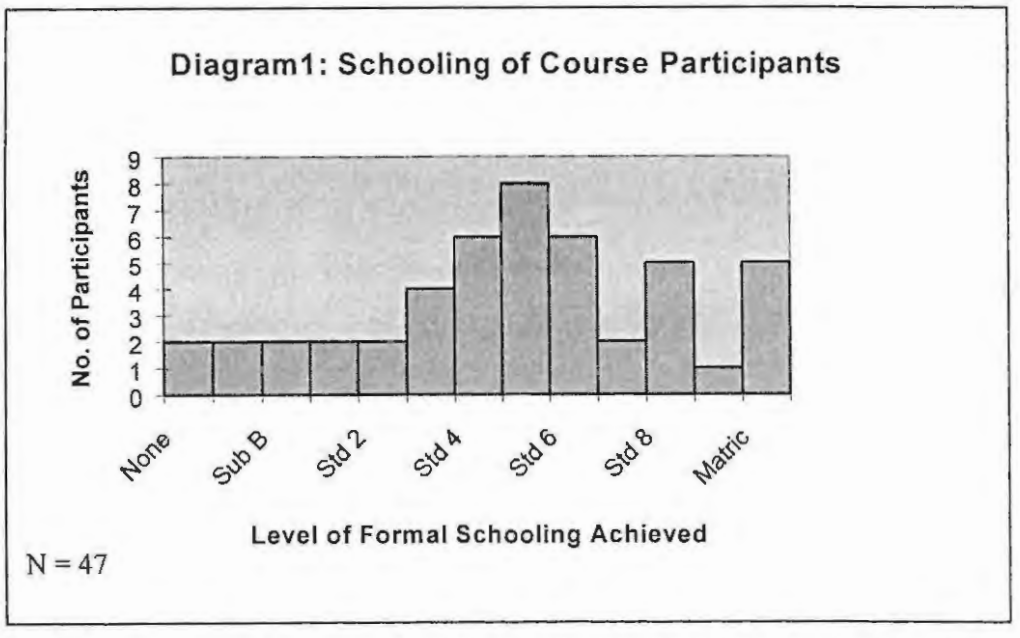
I tried to establish participants' knowledge of water catchments and biodiversity as I believed these were concepts important for an ecological understanding of the issues of alien plant removal. I struggled to know **how** to ask participants what they knew of these ideas. Two of the interpreters explained that there were no Xhosa words for these two concepts and, in an elaborate translation, one would have to explain their meaning. Dingela (pers. comm. 1999) explained that one can find phrases which equate with these words, but he could not find the words so easily either. One could use this problem creatively in an educational activity by describing the concept in English and then asking participants to find an equivalent word or phrase in their own language (Heylings, 1999).

With the last two focus groups I learnt to ask questions that were less direct to draw participants out on these concepts. For example, instead of asking whether participants knew what a water catchment was, I would ask what factors affected water quality and water quantity. This gave me an idea of how much participants believed conditions in the surrounding water catchment could affect local water supplies. Discussions on the drawings, and focus group discussions about the effect of *WFW* on the environment, also indicated knowledge of these concepts.

3. Data Analysis and Results

3.1. Primary Analysis

The information on the schooling of participants obtained from the focus group discussion is recorded as a bar graph (Diagram 1).



The diagram shows educational qualifications to range from no schooling at all to matric. 8.5% of the 47 participants had only a Sub B qualification or less, while 27.7% had at least a Standard 7 qualification. It is also noteworthy that 12.5% of the workers had matriculated

For the remaining data, I conducted primary and secondary analyses. For the primary analysis I drew up six tables to represent the results. These tables are included as Appendix B (pp. 31 – 35) as Tables A to F.

- Table A lists the components of drawings in response to the question "How has *WFW* affected your lives?"
- Table B combines responses from the group interviews about the drawings from the first Thomas Baines course with the responses to the focus group question "How has *WFW* affected your lives?" This combination was made because the former were more comparable to the *focus group* results than to the *individual* interview results with respect to frequency of responses.
- Tables C, D and E list focus group data obtained from the following focus group questions respectively "Why has *WFW* asked you to remove these alien plants?" "What signs have you seen of your work affecting the environment?" and "What has the *WFW* project taught you?"
- Table F lists the content of mimes that were intended to represent why *WFW* is important.

All tables also include the frequency of each response.

3.2. Secondary Analysis

Tables 1-8 (pp. 10 – 17) represent common themes extracted during a secondary analysis of Tables A to F.

3.2.1. Layout of Tables

Each of Tables 1 - 8 has six columns that represent the following:

- Column 1: Components of drawings and the individual interviews on those drawings (from the second, third and fourth *WFW* course);
- Column 2: Frequency (F) with which these components occurred in the drawings;
- Column 3: Responses from the group interviews stimulated by the drawings from the first *WFW* course combined with results of the four key questions from the focus group discussions.
- Column 4: Frequency (F) with which these responses occurred.
- Column 5: Images presented by workers during the mimes.
- Column 6: Frequency (F) with which these images were presented.

Items under columns 1, 3 and 5 have been listed according to decreasing frequency of occurrence and there is no correspondence across the columns. Footnotes to the tables, which are enclosed in inverted commas, are direct quotes from the interviews and focus groups.

3.2.2. Content of Tables

- **Table 1** represents workers' perceptions of the ecological implications of *WFW*. This is with respect to the effect of alien vegetation and its removal on indigenous plants and animals, water supplies in catchment areas, and soil conservation. The table illustrates that workers have seen what appears to be increased water run-off in areas where they have cleared alien vegetation. It also illustrates that workers are concerned about erosion and the fate of indigenous plants and animals. The table shows that workers would like to share their knowledge with their home community. Finally the table records misconceptions among workers about the chemical control of alien plants.

- **Table 2** represents workers' perceptions of the effects *WFW* has on water supplies in Grahamstown. Workers believed that they had taps in their yards, no longer experienced water cuts and obtained water at cheaper rates because of increased water due to *WFW*. Workers also showed an understanding of water reticulation systems and alternative means of obtaining water such as, from a rain water tank.

- **Table 3** represents workers' perceptions of how *WFW* has affected their lives with respect to their houses and gardens. Many of these effects are material such as an ability to pay rent; or to buy houses, furniture, other household goods. The table also illustrates how *WFW* has contributed to increased food security through enabling one participant to buy seeds to grow food and another, a duck. The table also shows workers perceptions of alien plants as useful for shade and as pot plants.

- **Table 4** lists secondary 'industries' that workers associated with the removal of alien vegetation. Workers drew felled exotic wood being collected by timber companies, women and donkey-cart owners; for use as firewood, and for cooking and building.

- **Table 5** lists workers' perceptions of how *WFW* has affected their lives with respect to personal finance, care and relationships. Workers have bank accounts into which their salaries are paid. They are able to buy food, clothes and cosmetics; and can pay for hair styling. The table also records improved family relationships mentioned by workers and notes the story of a father whose child was happy since he found employment and a woman who had found a husband through having employment. The table also records the different uses of water noted by workers.

- **Table 6** records other cultural or socio-economic implications of *WFW* as perceived by the workers. These are the provision of water and grass for cattle that have great cultural and economic

significance amongst Xhosa people. Also, workers noted that the *WFW* Programme had increased employment and reduced crime in Grahamstown.

- I felt that it was important to include 'the apple' from **Table 7**, because it shows that not all workers were comfortable with drawing.

- **Table 8** lists workers perceptions of how *WFW* can contribute financially to the education of them and their children (through schooling and further education), as well as what they feel they can teach others (teaching children about saving water and talking to their home community about water). It also shows what workers have learnt from *WFW*, such as mechanical control of alien plants (they have learnt to operate machines) and chemical control (they have learnt how to apply pesticides). They have also learnt facts about alien plants which explain why they need to be eradicated (they do not belong in South Africa and they use a lot of water). Finally they mentioned evidence that they have applied their knowledge from *WFW* such as through planting indigenous trees, no longer ring barking indigenous trees and using 'grey' water to water their plants. The frequency with which this applied knowledge is mentioned is noticeably less than the practical and factual knowledge.

Table 1: Workers' Perceptions of Ecological Dimension of *Working for Water*					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
River	37	After alien removal, springs and running water have been seen[2]	7		
Exotics absorbing water	16	There are grasses sprouting where aliens have been removed	5		
Indigenous trees	14	Alien trees out-compete indigenous plants[3]	3		
Grass	10	Indigenous trees thrive when aliens are removed[4]	2		
Wild animals drinking or grazing	8	Alien trees are not eaten by indigenous animals[5]	1		
Catchment areas (rivers from hills to dams / homes)	5	Soil erosion is prevented (when new grass comes up)	1		
Fish in a dam or the sea	3	Rivers have more water	1		
Indigenous trees absorbing water	1	Aliens need to be removed as they grow very densely	1		

Continued on following page

[2] The group said that they had seen springs near the sawmill where they had been working.

[3] "There is a contradiction between the indigenous plants and that trees [the alien species]".

[4] One participant demonstrated evidence of his knowledge of indigenous trees, by naming Rhus and Wild Olive as two of the indigenous trees that he has seen growing where they have removed alien plants.

[5] The participant that mentioned this had previously worked in the Botanical Gardens in Grahamstown.

Table 1 Continued					
Person watering an indigenous tree	1	Wild animals grazing in cleared areas[6]	1		
Exotic plants depriving agricultural products of water	1	High diversity of trees is important for indigenous animals[7]	1		
Erosion created by alien plants	1	Effect of chemicals on the land[8]	1		

[6] One participant demonstrated knowledge of the relationship between wild animals and indigenous plants: "Before the Hakea and Black Wattle were so dense that the animals couldn't even graze. So by cutting those dense Hakea, they can graze because there are grasses coming". When prompted, workers named these animals as Duikers and Dik-dik.

[7] "It is important to have a variety of plants, because if we have that variety of plants, other animals feed from that plants. And if we don't have that variety of plants, we are not able to have a variety of animals which feed on these plants". (The participant from whom this quote came also expressed concern about certain species becoming extinct because of the loss of the plants on which they feed).

[8] During a focus group discussion the following exchange occurred between the workers and me:

Ingrid: Are you concerned about spraying poison on the land? Response: No. We don't spray the land, we spray the tree.

Ingrid: When it rains, where will the poison go? Response: The poison doesn't wash away.

Ingrid: When the tree dies, where does the poison go? Response: The poison stays in the tree.

Ingrid: But the tree breaks down ... No response.

Ingrid: Do you believe that the tree will die, break down and go into the soil? Response: No.

Table 2: Implications of *Working for Water* for Water Supply in the Albany District					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
Taps	12	*WFW* aims to increase water supplies in the district[9]	12		
Communal taps or people collecting water at a communal tap	8	Township residents have taps in yards where they previously did not[10]	3		
People collecting water at a river / dam	5	Township residents no longer experience water cuts[10]	2		
Water related infrastructure	4	Water is obtained at eheaper rates[11]	1		
Water being collected at tap at home	4				
Person collecting water from rain water tank	2				
Water tank	1				

[9] One participant expanded on this by saying that water is scarce in South Africa. Another added to this and noted that by conserving our water supplies we would not have to buy water from other countries such as we do from Lesotho.

[10] The workers believed that they no longer experience water cuts and now have taps in their yards instead of communal taps, because as they chopped down alien trees, water supplies increased.

[11] One participant said that his community had had reductions in water tariffs since the 1994 elections. He believes that the reductions in service charges are a direct result of an increase in water supplies, because of alien clearing.

Table 3: Implications of *Working for Water* for Workers: House and Garden					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
Houses (2 cluster of houses, 36 single houses)	38	Workers have built houses	2	Water used to mix dung and mud to build a house	3
Furniture and other possessions in houses	8	Workers can afford rent	1	Workers have money to buy houses	1
TV aerials	3				
Trees planted for shade	3				
Garden vegetables using water	3				
Pot plant (bought with salary)	2				
A duck (bought with salary)	2				
Water used for washing cars	1				
Vegetable seeds (bought with salary)	1				

Table 4: Secondary Industry Associated with *Working for Water*					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
Timber company cutting or collecting trees	3				
People with donkey carts collecting wood	2				
Women collecting wood	1				
Collecting wood for fires	1				
Alien timber being used for building houses	1				

Table 5: Implications of *Working for Water* for Workers: Personal Finance, Care and Relationships					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
Money from WFW used to buy shoes	1	Can buy food for themselves and families	3	Water used to drink and to cook food	13
Happy child (because father has job)	1	Family relationships have improved	2	Water for washing self and clothes	10
		Can buy clothes for children and themselves	2	Workers can buy clothes, facial creams and pay for hair styling	2
		Workers have bank accounts	2	Water used to revive worker who fainted	2
		Worker found a husband because of employment	1	Water used to brush teeth	1
		Ability to buy skin care products has improved complexion	1	Water used to cool off	1

Table 6: Other Cultural / Socio-Economic Implications of *Working for Water*					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
Domestic animals drinking water	11	Cattle have grass to graze	2	Alien removal allows grass to grow for	1
		Employment has been created	1	Animals	
		Crime rate has been reduced[12]	1		
		High diversity of trees is important because of many medicinal uses[13]	1		

Table 7: Other					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
An apple[14]	1				

[12] One of the participants said that before they worked for *WfW*, they would do wrong things. Another participant added that because Grahamstonians are able to collect wood that has been chopped by *WfW*, the crime rate has been reduced. He said that before he worked for *WfW*, he used to go to town and steal women's purses.

[13] One participant showed that she valued a variety of trees by explaining that different trees have different medicinal uses.

[14] This person seemed intimidated by having to draw and could not explain why she had drawn an apple. I believe that she had not had much previous experience with drawing.

Table 8: Educational Implications of *Working for Water*					
Components of Individuals' Drawings	**F1**	**Focus Group and group Interviews**	**F2**	**Mimes**	**F3**
School or children going to school	3	Workers learnt to recognise different aliens	3	Workers can afford to send children to school	1
Water saving measures[15]	2	Workers remove trees that do not belong in SA	3		
Workers sharing their knowledge[16]	1	Workers learnt that aliens use a lot of water	2	Workers have learnt to water plants with 'grey' water	1
		Workers learnt how to use herbicide	2		
		Workers can send children to school	2		
		Workers learnt to operate certain machines	2		
		Workers can continue studies	1		
		Workers learnt that ring barking kills trees[17]	1		
		Workers learnt that oxygen comes from a tree	1		
		Workers learnt that we get timber from pine	1		

Continued on following page

[15] Such as an adult stopping a child from playing with water.

[16] Here the participant drew himself talking to others in a kraal and telling them about the importance of water.

[17] This participant used to ring bark indigenous trees to make a face mask for pimples, but she no longer does this after finding out how ring barking kills a tree.

Table 8 Continued					
		Workers teach community about alien plants	1		
		Workers have learnt first aid	1		
		Workers have learnt the importance of water	1		
		Plant indigenous rather than aliens plants	1		

4. Emerging Issues and Educational Implications

4.1. Sensitivity to Educational Levels

Any module developed for *WFW* workers needs to take the workers' different levels of formal education (Diagram 1) into consideration. Activities should be designed to be stimulating for, and not beyond the capabilities of, all participants. Some successful activities run during the Thomas Baines course included practical fieldwork such as planting seeds and transplanting seedlings in the indigenous tree nursery, discussion around pictures drawn by participants, and discussion stimulated by the Enviro-Picture-Building games and puzzles.

One should be aware that not all participants would necessarily feel comfortable with drawing. This is illustrated by the participant that drew an apple and could not explain why (Table 7). In educational programmes designed for illiterate or semi-literate people, one cannot assume that the use of drawings as an educational method will be successful. Also puzzles and pictures that are used should be carefully chosen. I found that after playing the Enviro-Picture-Building game, participants working in groups, although they had some difficulty, were able to complete the 'Build a Better World' puzzles (O'Donoghue, date unknown). A number of other suggestions for activities are made during the ensuing discussion.

It can be difficult having a broad range of educational qualifications in a group and to work with people not fluent in one's own language. But these potential disadvantages can be turned into advantages by using group work activities where participants at different educational levels can be mixed. This way, more advanced learners can learn through teaching their colleagues. The language 'barrier' can be turned into a 'bridge' by using the search for translations or common understandings to lead to new understandings of other cultures as well as difficult concepts (Heylings, 1999).

4.2. Social and Development Issues

Participants indicated that they believed they have benefited from *WFW* in a number of socio-economic ways (Tables 3 – 6). In the drawings of how *WFW* had affected their lives, two people drew groups of houses perhaps representing their community, but most participants (36) drew single houses (Table 3). The large number of people that drew single houses is perhaps an indication of the sense of security engendered by their employment. Eight people specifically said that they had bought a house since being employed by *WFW*. At the same time we should bear in mind that there was perhaps an over-representation of houses in the pictures because houses are very easy to draw. This is one limitation of using drawing as an educational or research activity. There was also a case in one of the individual interviews where a participant mentioned that the timber from alien trees is being used to build houses (Table 4).

Many of the economic benefits of *WFW* perceived by workers are the ability to afford basic needs such as housing, food and clothing and other material possessions, such as household goods and cosmetics. That workers could provide schooling for relations and further education for themselves was another perceived economic benefit (Table 8). There were also economic benefits mentioned that link to food security such as the participant that bought seeds to plant vegetables and another participant that bought a duck (Table 3).

Participants also drew pictures of *WFW* contributing to a number of secondary industries such as a timber company cutting or collecting trees and people with donkey carts collecting wood (Table 4).

It should be noted here that workers only mentioned positive aspects of receiving a regular wage (Tables 3 and 5). There is concern from management about the abuse of alcohol and drugs by workers (Powell, pers. comm., 1998; Preston, 1998).

Other needs were also met through the *WFW* wages. Participants had opened bank accounts and one woman indicated that she had found a husband through having employment (Table 5). The reduced crime rate, mentioned in one of the group interviews (Table 6), is an example of how employment can lead to an improved social fabric. Other improved social conditions are improved relationships with family mentioned by one participant and a child happy because his father has a job (Table 5).

An education module should be designed to enhance the perception of earning a salary as an opportunity to improve conditions beyond basic needs and material possessions. Activities such as food gardening, small business and education should be encouraged. An education module could provide support for entrepreneurial opportunities such as those provided by *WFW*.

Jensen & Schnack (1997:167) stated that 'there are social and societal perspectives involved in questions about the root causes of environmental problems'. When dealing with an environmental issue, one needs to take into account all the complexities of biophysical, social, economic or political nature that are linked to that issue (O'Donoghue, 1993; Lotz & Janse van Rensburg, 1998). Jules et. al. (1995) noted that adults learn best when they can share their own experience and when learning is relevant to their lives. Thus, considering all these socio-economic benefits as perceived by the workers, and the ways in which the *WFW* project is perceived to have affected the surrounding community socially and developmentally could be a useful entry point for discussing biophysical issues.
Table 2 illustrates that all groups were aware of one of the primary objectives of the *WFW* project - to enhance water security (MBB Consulting Engineers, 1999). But only one group mentioned that *WFW* was implemented as an employment creation strategy (Table 6). Such an aim is implied by a secondary

objective listed in the Regional Implementation Plan for *WFW*, which is to assist in the government's aim to alleviate poverty (MBB Consulting Engineers, 1999).

I believe that interesting critical reflection on the project and its aims could be stimulated by workers considering and discussing other objectives of the project such as 'to support the Masakhane Campaign[18]' and 'to empower democratic structures in the implementation of the programme' (MBB Consulting Engineers, 1999). As part of their education programme, participants should be encouraged to explore how the *WFW* project relates to different government programmes or campaigns such as the Reconstruction and Development Programme (RDP); the Growth, Employment and Redistribution Strategy (GEAR); and the NWCC. Workers should be able to look critically at their status as temporary workers so as to be able to understand and challenge their role in emerging environmental issues.

4.3. Water Supplies

One thing that that was mentioned in all focus groups was that alien plants use large quantities of water and that to remove alien plants would increase water supplies (Table 2). There are statistics that support this claim for other regions (DWAF, 1996b). Participants claimed to have practical evidence of this in the Albany region through their observation of new springs and running water where they have removed aliens (Table 1). Albany *WFW* has submitted a proposal for scientific research on the impact of the project on the water table. This proposal though was not approved and it is the intention of management to submit a revised proposal. The possibility of involving workers in a research project should be investigated. This would serve both an educational purpose and help to cut the costs of the project. Statistics and other information provided by research could be included and discussed in an education module to compare this with the knowledge workers have through witnessing empirical evidence. Such an activity could stimulate critical discussion and reflection amongst workers.

One of the most significant findings of this study is the number of misconceptions about the effect *WFW* has had on water supplies in Grahamstown. Firstly, one participant claimed that *WFW* had resulted in decreased water rates (Table 2). When this participant was asked whether he got this information from the *WFW* management staff, he said that the staff had told them that water would flow freely from the mountains to the water catchments, but not that this increased water supply would decrease water tariffs. Others in the group were asked whether they agreed with the conclusion, that increased water supplies had decreased water tariffs. They did. I asked them whether they did not think that it was the change to a government more concerned with the plight of 'township' residents that had

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[18] This is a government campaign aimed at promoting government accountability as well as participation by South African citizens in upliftment, delivery and development (African National Congress, 1997).

resulted in these decreased water tariffs. They still insisted that it was the increased water supply thanks to the *WFW* project. One participant did make a political link then, but in an unexpected way. He said that it was the duty of a government to implement projects that address water shortages. Thus the present government had been responsible for the reduced tariffs because they had implemented *WFW*. From having discussed this finding with Sidwell Dingela of *Working for Water* and Lil Haigh of '*Learning to Value Water*' I have established that water tariffs have not decreased since *WFW* came into being. There are two scenarios to which this participant could have been referring. The first is the scrapping of pre-1994 accounts by the City Council as these were considered to be 'oppressive' (Dingela, pers. comm., 1999). The second is the proposal to have a stepped tariff system where the price per unit of water increases with increased usage. This proposal, however, has yet to be implemented.

Another misconception was highlighted during the focus group discussions when individuals from two groups agreed that the fact that they no longer have water cuts is thanks to *WFW* (Table 2). One participant said that sometimes they used to only get 'drops of water' coming from the taps, but since they started the *WFW* project, 'the water runs more strongly'. Another participant said that he has water in his tap at home because of the *WFW* project. With prompting, the group agreed that another reason for the water cuts was because many people in the community do not pay for their water. It was still agreed, though, that the major reason that they no longer experience water cuts was the increase in water availability due to *WFW*. In three groups participants believed that *WFW* had resulted in them having taps in their yards instead of the old communal taps (Table 2).

An education programme with the *WFW* workers could help to clear up such misconceptions amongst workers. Therefore, reliable information regarding what effect the alien removal is having on water quantity, water services and the environment should be shared with workers. Care should be taken not to allow misconceptions to arise about the impact of alien plant eradication, particularly through 'in-house propaganda'. Through discussions with management and workers, however, I have found no evidence that there has been any such propaganda. I am unable to offer an explanation as to how the above-mentioned misconceptions have arisen.

The focus group discussions featured some debate over whether people should pay water tariffs or not. Four participants made drawings of water related infrastructure (Table 2) demonstrating an interest in how water is supplied to the communities. Later in the Thomas Baines course, participants were fascinated by our visit to the pump station at Howisons Poort Dam from where water for residential use gets pumped to Grahamstown. When they saw this process, it seemed to make sense to them that they should pay their water rates. Based on these findings, it seems appropriate to include an even more in-depth study of Grahamstown's water supply in the *WFW* education module. Links could be made with

'*Learning to Value Water*' who do 'water tours' including Glen Melville Dam - the dam which supplies most of the water to the townships. Such a study could lead to critical discussion over the rights and responsibilities of service providers and citizens receiving these services.

Another topic that should be included in an education module is South Africa's water supply in general. Mentioned by two of the participants (who both had matriculation certificates) were the scarcity of water in South Africa and the Lesotho Highlands Scheme (Table 2). The Lesotho Highlands Scheme would be an interesting case study to include in a *WFW* education module, as it is a contentious project and would stimulate critical debate around the issue of the construction of large dams.

During the mimes, when one group demonstrated using 'grey' water to water their plants (Table 8), other participants asked whether this does not kill the plants. This response serves as a motivation for the inclusion of discussion about water saving techniques in an education module for *WFW*.

4.4. The Uses of Water

Participants were well aware of the uses of water. Participants illustrated some uses of water, such as watering garden vegetables and washing a car (Table 3). Table 5 lists a number of uses of water which participants demonstrated during their mimes. I think to focus on such uses of water is a bit simplistic for adults, but participants might find it interesting to compare quantities of water use by households, agriculture and industry.

4.5. Knowledge of Water Catchments and Ecology

Table 1 describes an exchange between workers and me about the effects of chemicals on the land. I have since established that the chemicals that *WFW* uses to kill young exotic trees have varying active periods (Dingela, pers. comm., 1999). The two chemicals with which workers are most familiar have a short active period. One of these chemicals, Garlon, breaks down on binding with soil particles. I think that the exchange demonstrates an ignorance on the part of the workers of the nature of the poisons they use (they should have been able to tell me that the poisons do not last), a lack of critical reflection on the effects their work may have on the environment (they do not seem to have wondered about the poisons they use and their effects on the environment) and also a lack of ecological knowledge (they did not know how matter is recycled).

During focus group discussions I tried to establish participants' perceptions of water pollution. Participants informed me that '*mud*' and '*wild animals which wallow in the water and spread their ticks*' pollute the water and increase health risks. These responses were greeted with laughter by the

rest of the group, indicating that they did not agree. Yet it was only with prompting that the group agreed that factories and inadequate sewage facilities could cause the water to become polluted.

I also tried to establish what participants knew about water quantity. I have no evidence as to how successfully the 20/20 Vision Project has reached the home communities of the school pupils who were involved in the project, and thus I cannot estimate how much the workers may have learned from the project. Most participants knew that alien plants could affect the levels of water in the rivers. During focus groups, no suggestions were forthcoming to my question of what else (apart from alien plants) might affect the quantity of water in the rivers. This question was prompted by my concern that some of the evidence they have seen of increased water in the areas where they work (Table 2), might be due to seasonal or climatic changes. Workers should not have an unrealistic understanding of the effect that their work has on the environment. Discussions in an education module should cover what factors, apart from alien plant infestations, might influence the water availability in the Albany district. These might be political, economic and social issues, local and global climate changes, or loss of water due to run-off from disturbed and eroded land.

One observation, that demonstrated ecological concern by one of the participants, was that the grass that is coming up after the removal of alien plants is important for preventing soil erosion (Table 1). I think it is important to include the issue of soil erosion in an education module considering that there is a danger of soil erosion both in rivers infested by alien vegetation and in areas which have been cleared of extensive stands of alien vegetation. It would also be useful for *WFW* teams involved in alien eradication to exchange knowledge and experiences with the teams involved in rehabilitation of the land.

It seems that there is a limited knowledge and understanding of ecological concepts among the workers. This is problematic when people are working so close to the land. It would seem appropriate to include issues such as nutrient recycling, the dynamics of water catchments and related issues such as erosion and water quality and quantity, in an educational module for *WFW*.

4.6. Knowledge of Biodiversity

Some participants have noticed that alien plants out-compete indigenous plants, particularly because alien plants grow so densely. They have noticed that a variety of grasses and other indigenous plants have come up where they had removed exotics. Others noted that indigenous animals do not eat alien trees and reported on having seen wild animals grazing in cleared areas (Table 1). This demonstrates an appreciation of the impact of alien vegetation on biodiversity.

Some workers also had an appreciation of biodiversity. The participant that noted the importance of having a variety of plants so that there is also a variety of animals (Table 1) demonstrates this. Another example is the participant that valued the variety of trees because of their different medicinal uses (Table 6).

I feel that it is important that such appreciation of biodiversity is nurtured especially as it is consistent with one of *WFW*'s objectives to 'protect and restore biological diversity by reducing the competition by alien invader plants' (MBB Consulting Engineers, 1999:4).

4.7. Knowledge of Indigenous and Alien Plants

From Table 8 it is evident that participants were aware that the plants which they were removing come from other countries. When questioned, however, participants did not know from which country any of the plants came. Participants knew that eucalyptus trees were used for timber, but none of them were aware for what reasons these plants had been brought into the country. Part of the two-day course at Thomas Baines was an illustrated talk on the origin, and reasons for the introduction, of the exotic plants, which *WFW* is eradicating. After the session a number of the participants mentioned to me that they had found the talk very interesting.

I also tried to establish how clearly workers understood the concepts of 'indigenous', 'alien' and 'alien invasive'. From discussions with the workers it became evident that they were clear about the distinction between alien (those that they cut down) and indigenous (those that they don't cut down). All of the workers can physically point out the alien plants that they remove in the veld. They cannot distinguish between two similar looking exotic acacias though - the Long-leaved Wattle and the Port Jackson (They mis-identified a Long-leaved Wattle as a Port Jackson during the illustrated talk). One participant, who noted that indigenous plants are becoming established where alien plants had been cleared, named these indigenous trees as Wild Olive and Rhus - thus demonstrating a certain knowledge of indigenous plants (Table 1). Although participants did not always know the names of the plants they had at home for shade or decoration, they identified most of the trees around their homes in their drawings as alien trees. Sometimes indigenous trees were drawn (Table 1). One participant showed care for an indigenous tree by drawing a picture of him watering an indigenous tree that he had got from the 'place where I work' (Table 1).

Besides the socio-economic uses of alien plants (see 4.2.) workers mentioned other uses of alien plants, for example, alien trees are planted for shade, and alien pot-plants are used to decorate houses (Table 3).

In an education module, the numerous uses of alien plants could generate critical discussion on problem plants that have become useful, and what it would mean to local residents if they were to be eradicated completely. Particularly, the example of prickly pears and guava trees could be used because at the same time as being invasive aliens, the fruit from these plants provide a small but important food source and income for many people.

The workers also showed surprise when, during the illustrated talk on the origin of alien plants, they were told that potatoes, and the commonly grown maize, are alien plants. To develop a better understanding of these concepts in an education module, the difference between alien and indigenous should be discussed; as well as the difference between useful aliens (such as the potato), alien invasives which are both useful and harmful (such as gum trees) and useless and harmful alien invasives (such as jointed cactus).

Methods of alien control were also discussed in the focus groups and in the illustrated talk. Participants demonstrated knowledge of mechanical and chemical control, which they use in their work (Table 8), but no knowledge of biological control. Biological control is not a method used by *WFW*. I recommend that information on biological control be included in an education module, particularly as Trichilogaster acacialongifoliae (commonly known as the gall wasp) is widespread in the Long-leaved Wattle populations, which the workers are combating. The gall wasp is very useful in visually illustrating biological control, especially when the larvae hatch.

4.8. Education: Workers as Teachers and Learners

I have discovered that information on the above-mentioned Lesotho Highlands Scheme (see 4.3.) was given to participants by Sidwell Dingela - then a division manager of the project - as part of an informal education programme he and a colleague spearheaded at *WFW* (Dingela, pers. comm., 1999). This indicates that the project has had an informal educational role to play for the workers.

But it is evident from Table 8 that workers see themselves as both teachers and learners. In a focus group, a participant mentioned that they were teaching the community about alien plants (Table 8). One participant drew a kraal in which he was addressing a crowd about the importance of water (Table 8). The participant who drew himself stopping children from playing with water (Table 8) also shows how adults try to educate their children about the importance of water. These results indicate that some of the participants felt that they had a role in passing their knowledge gained from their *WFW* experience on to their home community. Perhaps *WFW* workers could be invited to participate in educational programmes in *WFW* or in water education programmes such as the *Learning to Value Water* Campaign. Another option would be for workers to develop a play for their home community on the issue of alien plant eradication.

The skills that workers have learnt can be seen in terms of practical, foundational and reflexive competence. Kraak (1999) describes practical competence as an ability to perform a set of tasks, foundational competence as an understanding of what we are doing and why, and reflexive competence as the ability to connect what is known with what we do so that we can learn from our actions and can adapt. Workers indicated that they had learnt many practical skills such as mechanical and chemical control of aliens, and first aid. They had also learnt foundational skills such as the understanding of why they are removing alien vegetation (because aliens use a lot of water and because water is important in our lives). Workers indicated that they employed water saving measures (preventing water wastage and re-using 'grey' water), no longer ring barked indigenous trees, and planted indigenous rather than alien trees (Table 8). Thus it seems that *WFW* has helped workers to develop reflexive competence through applying what they have learnt in their work to their everyday lives.

It is noteworthy that the frequency of reflexive competencies mentioned by workers is less than that of practical and foundational competence (Table 8). The development of all competencies is important, but with respect to environmental education, reflexive competence has the potential to equip workers to meet unfamiliar environmental challenges through learning from and adapting their actions. An environmental education module should aim to expand the development of such reflexive competence and to explore issues raised in more depth.

5. Recommendations

5.1. A Summary of Educational Implications

The context of Albany *Working for Water* and alien plant eradication offers many educational opportunities and challenges. An education module needs to be developed for *WFW* that takes into the account the opportunities and constraints of different educational levels and language abilities amongst workers.

This report has highlighted some of the issues that would be appropriate for an environmental education module and which could encourage critical debate. These include environmental issues such as the removal of alien plants that play a role in supporting subsistence economies, erosion caused by alien plants, water pollution, the use of herbicides in the chemical control of aliens, and biological control as an alternative control method. Other issues that could be included are the responsibilities and rights of service providers and citizens, workers' status as temporary employees and *WFW*'s place in national campaigns and programmes.

In an education module workers could be exposed to the dynamics of nutrient recycling and water cycles. Discussions on the water cycle could include rainfall patterns, more and less contentious water

supply schemes (including visits to local water schemes), effects on water quality and quantity within the catchment area, as well as water saving techniques.

An education module should play an important role in encouraging and supporting food security and entrepreneurial activities amongst workers. It should also encourage and nurture an appreciation of the importance of biodiversity.

The report has highlighted misconceptions amongst workers about water quality and quantity, social processes such as the provision of water services, and ecological processes such as nutrient recycling. Workers demonstrated a perception of themselves as both teachers and learners. I believe that it is important for workers to share knowledge of and learn more about these processes and concepts so as to have stronger foundational competence in their working environment. Workers could become involved in research on the effects of alien eradication on water quality and quantity. My research revealed evidence of minimal reflexive competence amongst workers. As reflexive competence can equip workers for meeting new environmental challenges, an environmental education module for workers should aim to develop such competencies.

5.2. Possibilities for Extending the Research

I hope that outcomes from the above research can be used to plan and implement an educational programme based on the educational recommendations made. There is also the possibility of developing an environmental education resource pack, which includes resources and ideas for activities, which could be used by other *WFW* projects. The potential for a *WFW* environmental education programme to be designed for accreditation within the National Qualifications Framework should also be explored. A formally recognised qualification would be of greater value to the participants than an informal environmental education module and would make a greater contribution to the socio-economic upliftment of *WFW* workers.

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Appendices

Appendix A: Discussion Guide for Focus Groups

- What level of schooling have you reached?
- Can you describe a typical day in the field for me?
- Which alien species are you targeting?
- What is the purpose of you removing these alien plants?
- What were you doing before you joined *Working for Water*?
- How has *WFW* affected your lives? (Socio- economically / developmentally / environmentally)
- What has the project taught you? Eg. Skills and knowledge (distinguish between what they knew before the project and what they learnt during the project).
- How is *WFW* affecting your communities?
- Have you seen any visible signs of your work having a positive effect on the environment?
- If not - do you believe that there are long term environmental benefits of your work?
- Are your communities learning anything through your association with the project?
- What do you know about alien plants?
- What do you know about water catchments?
- What do you know about biodiversity?

Appendix B: Tables from Primary Analysis

Table A: Components of pictures drawn in response to: 'How has *Working for Water* affected your lives?

Components of Individual Drawings	Frequency of response
Houses (2 cluster of houses, 36 single houses)	38
River	37
Exotic plants	27
Exotics absorbing water	16
Indigenous trees	14
Taps	12
Exotics being chopped down or sprayed with chemicals	12
Domestic animals drinking water	11
Grass	10
Wild animals or wild animals drinking or grazing	8
Furniture and other possessions in houses	8
Communal taps or people collecting water at a communal tap	8
People collecting water at a river / dam	5
Catchment areas (rivers from hills to dams / homes)	5
Water related infrastructure	4
Water being collected at tap at home	4
TV aerials	3
Trees planted for shade	3
School or children going to school	3
Garden vegetables using water	3
Fish in a dam or the sea	3
Water saving measures	2
Timber company cutting or collecting trees	3
Pot plant	2

Table A Continued

Person collecting water from rain water tank	2
People with donkey carts collecting wood	2
Money from *WFW* used to buy a duck	2
Women collecting wood	1
Water used for washing cars	1
Water tank	1
Person watering an indigenous tree	1
Participant telling others about the importance of water	1
Money from *WFW* used to buy vegetable seeds	1
Money from *WFW* used to buy shoes	1
Indigenous trees absorbing water	1
Happy child (because father has job)	1
Exotic plants depriving agricultural products of water	1
Erosion	1
Collecting wood for fires	1
An apple	1
Alien timber being used for building houses	1

Table B: Responses to the Question: 'How has *Working for Water* affected your lives?' Obtained from Focus Groups and Group Interviews

Response	Frequency of Response
Have taps in yards where they previously did not	3
Can buy food for themselves and families	3
There is more water in the area	3
Have built houses	2
Have bank accounts	2
Can buy clothes for children and themselves	2
No longer get water cuts	2
Family relationships have improved	2
Can send children to school	2
Found a husband because of employment	1
Ability to buy skin care products has improved complexion	1
They are teaching the community about alien plants	1
They learnt to operate certain machines	1
Crime rate has been reduced	1
Can continue studies	1
Can afford rent	1
There are different grasses coming up	1
Soil erosion is prevented (when new grass comes up)	1
Cattle have grass to graze	1
Indigenous trees are more successful	1

Table C: Focus Groups' Responses to the Question: 'Why has *Working for Water* asked you to Remove these Alien Plants?'

Response	Frequency of Response
To increase water supplies	12
They do not grow here naturally / do not belong in South Africa	3
Alien trees out-compete indigenous trees	1
They grow very densely	1
To supply grazing for domestic animals	1
To create employment	1
So that we can get water at cheaper rates	1
Alien trees are not eaten by indigenous animals	1

Groups = 12

Table D: Focus Groups' Responses to the Question: 'What signs have you seen of your work affecting the environment?'

Response	Frequency of Response
They have seen grasses growing where there were mostly aliens before	4
They have seen water running where before there were aliens	3
They have noticed places in the river where there is more water	2
Indigenous trees are growing faster	2
The grass is greener	1
They have seen water coming from a spring	1
They have seen wild animals grazing on the grasses	1
They have seen a landscape change	1

Groups = 12

Table E: Focus Groups' Responses to the Question: 'What has the *Working for Water* project taught you?'

Response	Frequency of Response
To recognise different aliens	3
That aliens use a lot of water	2
How to use herbicide	2
How to cut trees	1
They have learnt first aid	1
That oxygen comes from a tree	1
We get timber from pine trees	1
The importance of water	1
That ring barking kills trees	1
They plant indigenous rather than alien plants in their gardens now	1

Groups = 12

Table F: Content of Mimes Presented as a Representation of why *Working for Water* is Important

Mime	Frequency of Response
Washing themselves	6
Drinking water	5
Washing clothes	4
Eating food	3
Using water to mix cement or dung and mud to build a house	3
Using water to prepare food	3
Personal improvement[17]	2
Using water to revive someone who fainted	2
Alien removal allows grass to grow for animals	1
Brushing teeth	1
Having money to buy a house	1
Sending children to school	1
Using water to cool off	1
Watering plants with 'grey' water	1

Groups = 12

Drama as a Process for Adult Education in the Workplace: A Case Study of the Albany Working for Water Project

Paper submitted in partial fulfilment of the requirements for the degree of Masters in Education by Research Projects (Environmental Education), RHODES UNIVERSITY

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December 1999

Acknowledgements

I would like to extend my sincere thanks to the Working for Water workers for their dedication and enthusiasm for developing the play as well as for all the fun we had and for everything they taught me. I am glad that they had faith in me, that I *could* dance after all!

Thanks also to Eureta for her willingness to meet with me and fit me into her busy schedule whenever I needed her, and also for her unfailingly sound advice and insightful comments. I'm very grateful to Mike for showing me the road in the unfamiliar territory of 'play' and Monica for her careful editing.

Finally I would like to thank Herman for patiently helping me to negotiate spider webs of cords, cameras and video machines; for keeping me up to date with useful computer software and for surviving the piles of books and papers strewn about the house!

Introduction

This paper assesses the educational potential and limitations of the development of a play initiated with fifteen workers of the Albany Working for Water (WFW) Project. WFW is a government initiative for the eradication of alien plant species in South Africa. This project has a strong economic and social dimension through the provision of employment to marginalised sectors of South African Society such as women, youth and the poor (MBB Consulting Engineers, 1999). An important aspect of social development within WFW is education and training for the workers. In 1998 I offered a two-day environmental education programme for the WFW workers at the environmental education centre where I work. I initiated the development of a play with WFW workers as an extension of that programme.

I discuss the play as an educational process in the context of professional and basic adult education and training, and environmental education. In a similar qualitative study to Warner (1997), my research focused on the development of the play as an open-ended educational process rather than on education through the performance of the play. It is important to note that the scope of my research was limited to assessing the **potential and limitations** of the drama development process and was not an **evaluation** of the achievement of outcomes.

Data for the research were gathered through participant observation during the development of the play, and recorded on video and in a research journal. The data were then documented in the form of a summary and vignettes about each player[1].

Background and Rationale

Drama has been used in education and training in many different ways - with different objectives and approaches. Drama can be seen as a performance to convey some kind of 'message'. It can be seen as an activity where both actors and audience learn through participating in the development or performance of a play. In schools, it has been used to develop understandings of drama as an art form (O'Toole, 1992) or understandings of particular subject or a jointly selected issue (Warner, 1997; Burt, 1999). It has been used in different contexts as a force for social change (Mda, 1993; Hodgson, 1972). In the workplace it has been used instrumentally, simply to transfer or test practical skills or knowledge; as a process to develop life skills such as self-awareness or knowledge of others (Smigiel, 1996); or as a conscientising process - to mobilise people in order to generate support for a particular struggle (Von Kotze, 1988). My intention was to use drama to develop life skills as well as to explore environmental issues related to alien plant eradication.

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[1] The workers and myself, who participated in the play, are henceforth referred to as players

In my decision to use drama for environmental education, I was influenced by the notion of process drama where 'teachers and students jointly enact a fictional world as they explore the human condition' (Taylor, 1996). It is during the process of creating that fictional world that learning occurs, not only through producing or watching a final product (O'Toole, 1992, Burt, 1999). Process-orientated educational methods are currently being proposed in the field of environmental education (Lotz, 1998). I chose such an approach so as to open possibilities to us as players to co-determine the content and direction of our learning in a localised context (*ibid*). O'Toole (1992:4) described how a group of people involved in developing a drama must 'continually renegotiate the way in which they can manage and manifest the basic elements of dramatic form'. In this context, O'Toole is concerned with drama as an art form. But I saw the need for ongoing renegotiation about the content (as well as the form) of the play as creating learning opportunities for improving understanding of work-related environmental issues and the development of communication, problem-solving and critical thinking skills.

The epistemological rationale for selecting this educational process was an understanding of knowledge as being socially constructed through a 'dialectic interplay of subjective views' (Le Roux, 1997:49; see also Fien, 1993). Increasingly, facilitators in the fields of development and professional adult education and training are acknowledging the importance of participatory processes (Jules et. al., 1995; Mukherjee, 1997; Lotz & Janse van Rensburg, 1998). The educational potential for such participatory processes are discussed by Pretty et. al. (1995). That is that the complexity of the world and multiple perspectives of situations can be revealed through group analysis, interaction and cumulative learning. This can lead to debate about change and changed perceptions of situations. The WFW play was an opportunity for representing a co-construction of local work-related environmental issues. Co-construction through critical dialogue could occur during different stages of the development of the play: during researching the topic of the play, presentation of that research, and developing the content of the play. I describe these stages in the section entitled 'The Process of Developing the Play'.

My interest in WFW was sparked by previous research on the perceptions of work-related environmental issues of WFW workers (Schudel, 1999a). The data for this research were gathered during the above-mentioned centre programme with the WFW workers. My research revealed that the workers had useful knowledge to relate from their work in the field, such as their observation of springs running in areas where they had removed alien vegetation, and the return of indigenous plants and animals to those areas. There were also misconceptions amongst workers, however. For example, most workers believed that the improvement in water services in the township (the result of municipal action) was a result of water increases due to the removal of alien vegetation. Also, some workers demonstrated knowledge that others did not have. Examples are that most indigenous animals cannot survive on alien vegetation, and that it is important to conserve plant biodiversity so that animal diversity is also conserved. Thus there are, on the one hand, valuable experiences and insights among the workers to share both with each other

and with the Grahamstown community, and on the other hand, a need for critical dialogue and learning about certain issues. In addition, the workers felt that they had a role in passing their knowledge gained from their WFW experience on to their home community. I therefore recommended (Schudel, 1999a), that educational activities be designed for sharing knowledge amongst WFW workers and for workers themselves to become involved in education programmes in WFW. These recommendations motivated the initiation of the play.

Initiating a play with the WFW workers was also motivated my interest in exploring a different education method. The centre programme which I previously offered to workers included activities representing a range of educational methods, one of these being a role-play. I had limited success with the role-play in which I pre-determined the roles, the situation and the characters. There was not much participation or visible evidence of learning during this activity. Smigiel (1996) believed that participation, developing and owning roles are important in drama processes. I speculated that the limited participation might have resulted from a lack of development and ownership of role. Thus, as an alternative educational method, I chose the development of a play where participants would select, research, develop and perform their own roles.

The Process of Developing the Play

I approached workers from WFW in search of people interested in developing a play about work-related environmental issues. I invited the fifteen workers who showed an interest to a workshop to stimulate enthusiasm and develop skills and confidence amongst the new 'players'. The Rhodes Educational Drama and Theatre students and a local drama group, the Masande Players, presented this workshop. Warner (1997:22) suggested that 'the full power of drama can be realised only when the inner world of meaning is connected to the outer world of expressive action' and I hoped that the development of our drama skills would help us with that external expression.

In the second workshop I organised, the other players and I selected potential issues around alien plant eradication using pictures drawn by participants during the centre programme mentioned above (Schudel, 1999a). The players each selected an issue to research and I suggested that we obtain information about these issues by interviewing people. I gave some players pamphlets and other information to read. The literacy levels of workers varied widely (Schudel, 1999a). Of the group involved in the play, all could read, although some with difficulty. Thus the value of this written information was varied. At home, players researched the selected issues and identified emerging issues of interest. During the third workshop, players presented their findings to each other and we identified further research needed through questions from the group.

It was at this stage that the process was hindered when all workers from the Albany WFW project were temporarily laid off due to lack of funds[2]. Three of the players found new employment and were unable to continue with the process. It was a difficult decision whether to continue or not, as I did not know whether I could expect workers to dedicate their time to a play when their lives and livelihoods had been so disrupted. Yet on discussion with the players, they expressed an interest in continuing. They continued to attend the workshops, but their attendance was sporadic and the important 'research phase' of the play development was disrupted. I was pleased at the players' continued interest in spite of these difficulties and took this as an indication that the players found the play, in some way, worthwhile.

Players started to present their follow-up research and began to choose the characters that they wanted to play. The development of the 'script' was initiated by deciding on the order that characters should come on stage and then starting to act *ad lib*. I recorded the play on videotape as we performed and I wrote up and distributed a rough script to each player. We called the play "What is a World without Water?" The story revolved around two main characters, a petty thief and his friend who decided to look for work at WFW. They were tasked by The Project Manager to cut down the alien tree Long-Leaved Wattle. Much debate arose between Long-Leaved Wattle, The Workers, The Old Lady, Water, Soil, The Schoolchild, The Wasp, The Donkey Cart Owner and The Buck over whether the tree should be cut down or not and what should happen to the felled wood. Mrs Faku (The Mayor) was a character that had a concern that WFW was getting the credit for improved water services in the township.

After some time, all but five of the players were invited back to WFW and attendance of workshops and rehearsals improved. Of the five unemployed players, three continued the process with us. One kept missing rehearsals and performances. Another was offered a job and left the group. One more person joined us – a contractor[3] called Lindy. It was not long before Lindy's strength of character identified her as a person who would be able to drive the performance and even the continued development of the play, thus allowing me to withdraw from the process after a time. Once we were satisfied with the play, we began with performances. We performed the play for a primary school and for the players' colleagues at WFW.

In the next section, I record (in boxes) or describe selected extracts from summaries of the process and vignettes of the players[4], and discuss the educational potential and limitations of the drama development process.

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[2] The reasons and implications for these funding cuts are discussed in a situational analysis I conducted of WFW (Schudel, 1999b).

[3] WFW employs 'emerging contractors' who are temporarily assisted by WFW. After some time, the 'emerging contractors' become independent contractors who tender for work on an open contract system (Schudel, 1999b).

[4] The names of the players have been changed in this paper so as to protect their identity.

The Drama Development Process: Potential and Limitations

A Participatory Process

Even though several players were shy and reserved especially in the beginning, each player contributed by researching a certain character for the play and reporting back to us. It was at this stage that the potential of participatory processes to create dialogue about environmental issues was at its peak. I was pleased to see that there was more participation with respect to active discussion and players directing the process, than had occurred during the role play that was part of the centre programme. Later in the process the participation of the players became more performance-orientated as I illustrate below.

As we proceeded players demonstrated increasing ownership of the play by participating in a number of ways. One way was through sharing drama and musical skills with each other and me. Sidney was a good actor and often helped others in developing their parts. Valerie took it upon herself to teach me to dance. Xolile regularly brought his friends from the Masande players to help us during rehearsals and on one occasion he spontaneously led us in an icebreaker game. The players encouraged each other; and organised each other to enter stage on cue, to focus on the task at hand, and to arrive at rehearsals. [5]Monwabisi would often ask obscure questions and act out of turn. I was amused on one occasion when, not realising that we had moved on from a heated exchange about how Valerie should play her part of The Old Lady, Monwabisi picked up The Old Lady's stick and started acting her part while I was trying to talk. Nokuzola took the stick away from him and whacked him on the behind. Richmond, Xolile and Lindy played an important role in translating some of the complex dialogue. Players also contributed props and costumes from home, made suggestions for the structure of the play, and added humour and 'spice' to the play and our rehearsals. I think that the value of these contributions is reflected by Dorothy Heathcote's support for drama as a process when she says that:

> Drama is a means of learning, a means of widening experiences even if we never act in a play or stand upon a stage (Heathcote, 1972:158).

After two performances (four months into the process), I discussed with participants whether they would be able to continue on their own. They seemed quite sad that I was leaving them, but particularly Lindy was confident that they would manage on their own. Since then the group has continued rehearsals without me, and performed for a private school and at the Environmental Education Association of Southern Africa's annual internal conference that was held locally. I believe that the participatory nature of the development of the play contributed to its 'sustainability'.

Communication

Integral to participation is an open communication process, which may be influenced by factors such as teaching methods, power relations, language and the degree of trust between participants. The influence

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[5] Translated from Xhosa, this name means 'the entertainer'.

of teaching methods can be illustrated by the following example. During the centre programme participants commented on the interesting talk I gave on the origins and control of alien plants. Yet the three players who had attended that programme could not explain the process of biological control in the Long-Leaved Wattle (a process I had described in detail during the programme). This led me to question the effectiveness of educational processes that simply entail the relaying of facts from educators to learners. I wanted to try an educational method which would entail more two-way communication between the workers and me, and which would allow for us to be both learners and educators. The principles for environmental education from a Non-Government Organisation Conference held in Rio stress the importance of acknowledging that we are all teachers and learners (International Council for Adult Education, 1992). During initial workshops, the players did not spontaneously communicate with me or amongst themselves. But further into the process, the presentation of our research on work-related environmental issues and the planning and discussions about the emerging play necessitated communication between us.

I believe that the increased communication I observed was also due to changed power relationships amongst us. Usher (1997) reflected on how focusing on the learners' experience highlights and confers meaning on knowledge and skills previously undervalued. I think that choosing to develop a play in a context with which the workers were familiar helped to strengthen their sense of their knowledge and skills as being valuable. Drawing on Michel Foucault's perception of power as relational and potentially enabling (Darier, 1999), I see this increased valuation of the workers' knowledge as having changed power relations, allowing power to circulate more freely amongst us. This enabled the workers to offer opinions and make contributions to the process with more confidence, thus changing the previously dominant relationship of me as teacher only and workers as learners only.

Another contributor to the improved communication between workers and me, and between workers themselves, was probably the fact that they could use the language they were most comfortable with. Many WFW workers are not confident with the use of English, while my Xhosa is even more limited. Thus, in exchanges between us, where I played predominantly a teaching role, most dialogue had to be translated. The nature of the drama development process meant that not all learning had to occur **through** me, and that the workers could speak to and teach each other in their own language. There were times when, in the interest of not interrupting what seemed like stimulating discussion amongst players, I did not ask for a translation and relied on my limited Xhosa plus a reading of body language as to whether 'correct' information was being exchanged. One such occasion is illustrated in an exchange recorded from our second workshop (Box 1).

Box 1: A Discussion on Water Catchments

Ingrid: Do the people who were at Thomas Baines [the environmental education centre] remember what we call the area from where the water comes?

Monwabisi: (Says something in Xhosa and uses the word 'catchment')

Samuel: Water catchment.

Very demonstratively Monwabisi gesticulates with his hands and speaks very fast in Xhosa. It looks as if he is explaining it well. The words I pick up are water catchment and *intaba* [meaning mountains]. I don't ask for a translation, as I am confident that Monwabisi has done a good job.

Yet another potential contributor to the improved communication between us was the development of a relationship of trust. This is illustrated by the willingness of people to talk honestly about their values and to reveal potentially incriminating evidence about themselves (Box 2 and 3).

Box 2: Challenging Values

Nxolo commented that she wanted to find out whether Grahamstown people generally used their money in the 'proper way' – to buy food and clothes for their children – or the 'improper way' – to buy liquor and drugs.

Boyzie replied that people who use drugs and alcohol, don't necessarily use all their money for such things, they will buy a little with the extra after they have paid their rent, rates and food. He said: 'I smoke dagga [marijuana]. I'm not ashamed to say it. But most of my money goes to my parents to pay their bills'.

Box 3: Interviewing an Ex-thief

Tembi interviewed Vuyani to get the opinions of someone who had been involved in crime, but who had changed his ways after finding a job with WFW[6]. Indirect references by Tembi, who was a friend of Vuyani, led us to believe that Vuyani had indeed been involved in crime before being employed by WFW.

Understanding Complexities and Challenged Understandings

Within the field of Adult Basic Education and Training (ABET), there are concerns that there is a need to provide workers with an 'understanding of the social and scientific context of their work' - a need not addressed by conventional approaches to literacy and numeracy education (Favish & Lurie, 1994). Environmental educators also recognise a need for guiding people to understand the complexity of environmental issues and the interactions between social, economic, political and biophysical systems (Lotz, 1999). Theatre in education can address these needs through opportunities for discovering and

[6] Ironically Vuyani was one of the people who were retrenched by WFW after the budget cuts. In Schudel (1999b) I refer to these budget cuts.

learning about how social processes work, and through its concern with human interaction and understanding (O'Toole, 1976; Smigiel, 1996). During the development of the play we explored the interactions between human and biophysical systems through the The School Child who was grateful that her father was employed to cut down alien trees and thus could afford her school fees; and The Old Lady who was angry with WFW for cutting down gum trees which she considered to be her heritage.

Bolton (1993) described theatre in education as having an emphasis not only on understanding, but also on change of understanding. Box 4 illustrates how, through developing the play, a platform was created for dialogue, investigation and changed understanding about the socio-political and biophysical aspects of water supply. That changed understanding was taken further in that it became part of the play itself.

Box 4: Where does the Water Come from? Challenging our Understandings

Workers believed that improved water services in the townships were due to the removal of alien plants by WFW. This was not the case firstly, because these improvements were politically motivated; and secondly, because WFW could only affect water supplies downstream from Grahamstown[7]. Through interviewing a municipal worker, Vuyani established that the improved water services were due to political changes in South Africa, which gave local people a voice through the Masakhane Committees[8]. In the play, Mary portrayed the role of Mrs Faku who was concerned about the misconceptions which were being circulated by Albany WFW workers about the provision of water services. Samuel, in the role of Mr Andrew (the project manager), promised to hold workshops with the workers to ensure that these misconceptions were addressed.

The concept of soil fertility was another topic of debate raised through the players' research (Box 5). The examples of how Mary helped Luke with his research and how Richmond and Monwabisi offered what seemed to be misleading explanations about soil fertility illustrates that care should be taken that constructivist teaching methods, privileging the collaborative construction of knowledge, do not perpetuate misconceptions. I was concerned that people who work so close to the land, and might want to plant vegetables in their gardens one day, believed that rain increases soil fertility. I felt it was important to understand that plants need not only water, but also nutrients to survive. In our play we explored this through Long-Leaved Wattle who stole water and nutrients (cardboard representations of calcium and phosphorous) from indigenous plants.

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[7] Schudel, 1999b

[8] Committees established by the Masakhane Campaign. This is a South African government campaign aimed at promoting government accountability and participation by South African citizens in upliftment, delivery and development (African National Congress, 1997).

Box 5: What *is* going on in the Soil?

During our second workshop Richmond said that after aliens are removed the 'water will come back and make the soil more fertile'. Luke made a similar statement during his report on his research on soil. He reported (from notes written by Mary) that 'when we remove the alien trees there is only soil. After it rains, the soil will become more fertile'. I explained that plants needed water to be able to absorb nutrients from the soil, but that the rain itself does not contain nutrients to make soil fertile. Monwabisi disagreed saying: 'There is something going on in the soil because of the rain. If there is a drought there is nothing, but then comes the rain and the rain gives the soil fertility' (translated by Richmond). Richmond disagreed with Monwabisi saying that 'It is the soil that produces the vegetation'. From this, I deduced that Richmond had changed his understanding of soil fertility, but I was unsure whether Monwabisi had changed his understanding.

Time Limitations

I would have liked to address the workers' understanding of topics such as soil fertility more thoroughly. For example I would have liked to help the workers to understand nutrient cycles. I could have designed an activity or, demonstration to illustrate how plants survive in soils of different fertility, but I was always conscious of the time constraints that I had on the play. WFW contractors were working on a system where they were paid according to the amount of land that they cleared. Thus I was always aware of taking people out of work and of a need to limit the number of workshops. This situation is typical of workplace-based learning (Jenkin, 1999). Also I felt it was important to ride the momentum created by the players' enthusiasm for moving on to other topics as well as the development of the play (Workers had already asked me at the end of the first workshop when we were going to start with the play).

As a teacher, it is important to realise that one cannot be prepared to address all issues that may arise during such open-ended learning processes, but one can use the extended nature of the process to find creative ways of addressing issues after they arise.

Skills Development

Favish and Lurie (1994) articulated the importance of workers being able to develop to their full potential through skills that develop their flexibility to adapt to changing work situations. I believe that Favish and Lurie cast a vocational approach to adult education in what Lotz (1998) refers to as a humanistic framework which aims to make education and training more socially relevant. They therefore go beyond a vocational framework which merely aims at 'turning out the product which industry consumes' (Usher et al., 1997:110). Drama has the potential to develop valuable skills in a humanistic approach to education and training. These skills include working co-operatively with one other (Smigiel, 1996) and the ability to listen and converse reciprocally (O'Toole, 1976). These skills can contribute to the 'co-operative meaning-making' which Lotz (1999:54) cites as important amongst adult learners. From

an environmental education point of view, these same skills as well as problem-solving and critical thinking skills, are essential for understanding and responding to complex environmental problems (*ibid*). The potential and limitations, in the context of the WFW drama, for the development of these skills are discussed below.

Listening

During one of the workshops, where we acted the play *ad lib*, I noted that some discussions between characters were not very constructive. I was hoping that discussion would lead to greater depth of understanding or resolution of problems. The players seemed not to listen carefully to each other, which may have led to an inability to construct a reciprocal discussion while in character. Thus I led them in some games from Boal (1992) to try and improve listening skills. The scope of my research did not cover establishing how successful these games had been, but the above illustrates a need and a potential for developing listening skills through drama.

Co-operative Problem-Solving

Another reason for players' apparent difficulties with conversing reciprocally could be limited problem-solving skills. Vuyani was notably one of few players who looked for solutions to the problems raised, while in character, as well as during discussions. This is illustrated by his contribution to the discussion recorded in Box 6.

Box 6: Discussion on Soil Erosion

Luke: By cutting alien plants we prevent soil erosion

Ingrid: How does that work?

Luke: The aliens are stacked in windrows to prevent erosion

Ingrid: What happens if the donkey cart people take the branches and use them for building? What will happen to the soil?

Vuyani: We should share the branches 50\50 between the people and the windrows.

In the beginning negotiation amongst players was limited (they tended to rely on me for suggestions). Yet as we proceeded, problem-solving skills were increasingly demonstrated by players: through negotiating who was to play what part, who was to come on where and when, and how the dialogue should proceed.

Critical Thinking Skills

Critical thinking skills enable learners to deconstruct their, and others', understandings of an issue and reconstruct a new understanding of that issue as well as identify possibilities for change (Huckle, 1991; Greenall Gough & Robottom, 1993; Favish and Lurie, 1994).

Mirrione (1993) believed that theatre in education has the ability to develop critical thinking skills with which to challenge preconceived ideas. O'Toole (1976:86) supports this:

> Since time began, man has been subject to the power of custom and tradition, the forces which uphold society and stifle change. By showing the possibilities, and the dangers, of change, and holding up alternatives for comparison, theatre in education can momentarily offer to individuals who make up the audience the choice between the discrimination that brings risk and the conformity that offers security.

By involving the players in the development of the play, I hoped that these opportunities would be created for them **as well as** the audience. By referring back to Box 2 (pg.7), one can see how the drama development provided the opportunity for players to take such risks. Through challenging conventional understandings of 'proper' behaviour, Boyzie added a critical aspect to the discussion.

Another example where a player had an opportunity to talk about his involvement in a sensitive matter is illustrated in Box 3 (pg.7). By talking openly about themselves and their values, players created opportunities for critical dialogue, but as is illustrated below, we could have explored the issues raised in more depth. Vuyani chose to play the role of a thief and a drunkard who was convinced by a friend that he could do better things with his life by going to WFW to look for a job. Mda (1993) described cases of the drama process itself becoming a form of critical social comment. During the rehearsals I suggested that, in the play, Vuyani complain that a temporary job such as that offered by WFW is not a lasting solution to his problem. This was an opportunity for critical comment on the insecure position that temporary workers hold at WFW (Schudel, 1999b), but Vuyani did not respond to it. I saw another opportunity for critical comment when the donkey-cart owner was included as a character and the owner came on to the stage whipping the donkey to get it going. I suggested that the donkey should kick the owner and refuse to go further until treated better. I made this suggestion because during a discussion in the second workshop Vuyani expressed concern about the treatment of the donkeys. Perhaps my suggestion was not taken up because, at the time, Luke was acting the part of The Donkey Cart Owner and we were struggling to get him to project the character. Perhaps the absence of drama skills among participants was the reason that not much social comment occurred within the play itself.

Conclusion

I explored the value of the participatory development of a play in creating opportunities for learning through dialogue and learning through a widening of experience. I illustrated how developing a play can lead to improved communication between 'teacher' and 'learner' and can even lead to an exchange of these two roles. I speculated on four reasons for improved communication. These were firstly, the need for us to create a product meant that we had to communicate to plan and discuss the emerging play; and secondly, changed power relations amongst us due to an increased valuation of workers' knowledge.

Communication was also improved by the opportunity for workers to use their own language and to learn through each other rather than through me (with translation), and by the development of trust amongst us. Ironically, the need to create a product improved communication amongst us as players, but at the same time also limited the learning process. Although my intention had been to focus on the process rather than the performance of the play; time, workplace disruptions and the players' impatience to finalise and perform the play always pressured me. This meant that I could not spend as much time as I would have liked on potential learning opportunities. I did acknowledge though, the need for creativity on the part of the educator in responding to unplanned learning opportunities when they arise.

Discussions during workshops created opportunities for challenging and changing values and understandings of social and biophysical processes and their interactions, and afforded an opportunity for us to talk about sensitive issues among ourselves. The drama itself was a useful forum for expressing some of these values and understandings and for exploring the complex issue of alien plant eradication.

The development of the play also had the potential to develop life skills such as listening, co-operative problem-solving and critical thinking skills. Unfortunately limited listening and problem-solving skills were displayed during the process and social conditions and understandings that were critiqued were not explored with much depth. In my role as facilitator, and with more time and drama experience, I could have made more use of other drama techniques such as forum theatre (Boal, 1992). I could have used these techniques to develop the above as well as other drama skills, and show the potential of drama to respond to environmental issues and problems.

From a narrow vocational viewpoint, the open-ended nature of drama development processes has been seen by management in business to be at odds with competency-based training outcomes. Educators have been accused of wasting time and playing games with drama (Smigiel, 1996). Yet, I feel that by continuing the process in spite of insecure employment conditions, the workers demonstrated that they were experiencing something worthwhile in the process.

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