

Environmental Studies: Lessons from a Quaternary Perspective

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Introduction

At the beginning of the last decade, Silver (1980, p.7) was able to write with assurance that 'Behind our political and ideological disagreements...lies a crucial, common confidence in the educational process', a confidence based on education's ability both to maintain the social, political and economic status quo *and* to change it. Over a decade later, and with our awareness of global environmental crises that those years have brought, the authors have become increasingly convinced of the practical fact that formal education in our society has functioned predominantly to *maintain* the social, political and economic conditions that have produced environmental crisis and is thereby severely hampered in its ability to make the changes necessary to stop the degradation of our planet, let alone improve its health.

Although we do not propose that the deteriorating state of the planet can be attributed to any single underlying cause, we would suggest that a generic term for many of these causes is the 'culture of positivism' (Giroux 1981, p.38) which, in Giroux's words, has a 'limited focus on objectivity, efficiency, and technique ...'. Gough too (1987, p.54) argues that Western industrial society's systems of education rest on 'an epistemological paradigm', a particular set of theories about how human beings gain knowledge of themselves and their world as well as the kinds of knowledge that are valued. According to Gough (1987, p.54), the kinds of knowledge which have dominated Western industrial education are those which have been structured by Western society's dominant form of theorising, namely: positivist, empirical science. The idea of a culture which is mechanistic and reductionist, which encourages human beings to dominate and control 'nature', and which looks for ever more sophisticated 'technical fixes' to overcome the tragic results of its own logic is reflected also throughout the 'green' literature. See, for instance, Bookchin (1986 and 1990), Fox (1990), Passmore (1980) and Young (1991). Ways in which this dominant culture adversely affects our relationship with our environment are documented in the same literature.

Clearly, ways of teaching that do not simply reproduce the epistemological/positivist culture are required if our relationship with our environment is to change. In fact, what is needed is a way of teaching that will actually undermine this culture whilst promoting what Gough (1987, p.49 - 67) calls 'an ecological paradigm', one that strengthens 'beliefs in the value of inner, subjective experiences' (Gough 1987, p.54). Giroux (1981,

p.55) argues that 'The role that teachers play in the schooling process is not a mechanistic one. To the degree that they are aware of the hidden assumptions that underlie the nature of the knowledge they use and the pedagogical practices they implement, classroom teachers will be able to minimize the worst dimensions of the culture of positivism'. For Giroux, it is the curriculum (including both its content and its affective aspects) which may embody the elements of either domination or of liberation, of the positivist paradigm or of a new or emerging paradigm.

At this point we would stress that a belief in a more ecological paradigm does not mean, to us, a total rejection of reductionist science. In fact we contend that it is only through a thorough knowledge of the workings of the planet that human beings can hope to live as natural components of a natural world. Without this thorough knowledge our numbers and our technology are likely to continue to impact upon the planet in ways which are dangerous to ourselves and to every other living thing. This knowledge will entail research and ways of knowing that lie within the positivist paradigm. It will also entail ways of knowing that do not lie within such a paradigm. The current hegemony of the positivist paradigm ensures that alternative ways of knowing are outside the terms of reference of researchers and it is this blindness to more subjectivist alternatives that we would wish to correct. This paper explores some preliminary steps which have been taken towards this objective by an environmental studies department in a university context.

Greenall (1987, pp.16-17) points out that while 'the necessity of an interdisciplinary or holistic approach to environmental education' is recognised, 'it has become increasingly apparent that this approach is not realistic within the existing structure of most schools, whereas a new subject may be'. She suggests that there has been a growing acceptance of environmental studies as such a new and separate subject in schools. This is true for universities also. Environmental studies at the University of Adelaide is offered only as postgraduate courses (a Graduate Diploma in and Master of Environmental Studies). It has, therefore, always had a sense of being added to the sequence of primary/secondary/tertiary education that students have passed through (hence our view of environmental studies as being from a quaternary perspective). It can be said to be qualitatively different from the formal education experienced previously by students, since it has also always attempted to be multidisciplinary in outlook. Therefore, environmental studies is not just an addition to primary, secondary and tertiary education - more physics, more biology or whatever - nor does it aim to emphasise, say, land management principles or other topics which might be said to have a specifically 'environmental' orientation. The holistic orientation of the curriculum embodies not only the study of ecological processes and such like, but also a critical analysis of the power structures of society and the political and economic processes which currently work against solving environmental issues.

Because of the multidisciplinary aspect of the environmental studies curriculum already in place, the potential exists through environmental studies to create fundamental change in society, despite the fact that it is currently a separate subject. It is our contention that, with attention to the affective aspects of the curriculum (the so-called 'hidden curriculum'), it is relatively easy for environmental studies departments to function as 'terrain(s) of contestation' (Aronowitz in Giroux 1981, p.3). That is, environmental studies courses - through the curriculum - can begin to make overt the values and ideology which dominate Western industrial culture (the epistemological/positivist culture) as well as create space for discussion of those values which promote a more ecological paradigm. In other words, environmental studies can work towards social reconstruction rather than social reproduction. Some other university departments (such as geography, peace studies, women's studies) also have the advantage of an essentially multidisciplinary outlook and are in a similarly advantageous position.

However, a significant structural constraint on environmental studies within the authors' own university is the expectation that it will remain an academic 'subject' which divorces it, in a practical sense, from the world outside academia. This means that environmental studies may legitimately (in the eyes of the university) critique the way that environmental problems are currently solved and may even take a subversive political stance in its teaching which might inspire activism, but that environmental studies students and staff should not engage in active participation in resolving environmental problems, at least not within university time. However, as Greenall (1987, p.15) implies, the focus for students in environmental education should be on participation in the resolution of environmental problems, not simply on an awareness and understanding of the environment. Even if this awareness and understanding of the environment includes a critical analysis of the contribution of politics and economics to the problem, 'students develop an interest in increasing their awareness and knowledge by being involved in an issue and caring about what happens' (Greenall 1987, p.15). The authors were faced with the reality that this expectation of non-participation in real environmental problems was unlikely to be modified, at least in the immediate future. The response was to simulate reality to enable students to participate in environmental problem solving, albeit not in the real world. There are a number of other reasons why simulations are particularly suited to environmental studies courses, which will be discussed below.

Some teaching practices which promote the positivist paradigm

If we examine the process of Western industrial systems of education currently in existence, we begin to unravel how it is that we are able to treat the environment as if it consists of a series of discrete entities (including ourselves), and why it is difficult for us to find, and put into effect, solutions to environmental problems.

There is no doubt that our formal educational institutions teach a wide range of subjects and skills. Most graduates of universities emerge with an in-depth knowledge of one or two areas chosen from a range of academic disciplines. Each of us is taught some part of the way the world works, albeit to different levels of depth and detail. Yet, even those with a deep knowledge and understanding of their chosen field have little or no practice in solving problems which are cross-disciplinary by nature.

In fact, we are not taught that there *are* cross-disciplinary problems. Knowledge, as we go through school and university, is acquired in a gradual process of revealing 'the Truth' rather than in response to solving life's problems and most learning takes place out of context of any problem at all. This is not to say that we have no practice in problem-solving within our own disciplines, but the emphasis is on solving problems relating to the theory of the discipline rather than applying what is already known in that area to an external problem.

Only rarely are the knowledge and skills needed to solve interdisciplinary, environmental problems found in a single person. Usually it is necessary for a number of people with particular disciplinary strengths to co-operate, but this requires teamwork and neither students nor teachers are usually practiced at co-operation. Lynch (1989) points out that if one is to be involved in problem-solving activities which involve the respective interests of an intricately inter-connected set of people, then the experience of living and working in co-operation with other people should find some explicit expression in the experiences of learning.

However, the situation is not simply that we do not practise co-operative skills. Worse, we are consistently and remorselessly subjected to teaching practices which promote competition throughout our school and further education careers. Assessment is competitive because the credentials needed to get jobs are in scarce supply, as indeed are the jobs themselves. Not all competition is harmful, of course, but the overspecialisation of society, which results from relentless emphasis on competition between individuals, is. Overspecialisation results from a combination of two things. Firstly, knowledge has been split into distinct disciplines, a social process based on the positivist, reductionist paradigm. Secondly, individuals are forced to compete for economic benefits and status. As a result, gulfs of incomprehension and mistrust have developed between specialists in the various natural sciences on the one hand and the social sciences on the other. Not only do people lack the skills to work together, but too often they either do not want to or do not see the need to. So, important social decisions must often be made on the basis of ignorance, or from a one-sided point of view.

The particular range of subjects taught in schools and further educational institutions has varied over the years. In the past decade or so, there has been in most countries an increasing emphasis on technological and economic subjects in schools and universities, in response to the trend

towards economic rationalism which has pervaded the politics of most countries of the industrialised world in that time. However, environmental problems are not, as some would have it, simply economic or technological ones. As Sagoff (1990, p.6) argues forcefully, environmental problems 'are primarily moral, aesthetic, cultural, and political and... they must be addressed in those terms'.

Economic rationalism bases social decision-making on economic grounds. It assumes that the most rational decision is one which maximises efficiency, preferably with a degree of justice, in the allocation and distribution of resources. Environmental issues cannot be fitted neatly into this type of cost-benefit analysis. To be able to solve environmental problems we need to make value judgements, based on a social consensus of what sort of society we collectively wish to live in. Therefore, we need to develop 'the ordinary virtues of inquiry and deliberation' (Sagoff 1990, p.14). The space made available within the curriculum for the discussion of values should be widened.

Finally, but importantly, our educational curriculum does not include subjects designed to produce 'caring relations' (Lynch 1989, p.151). Schools and further education institutions are in the business of teaching individuals in order that they may compete for a range of credentials which enable them subsequently to compete for jobs. There is no place for teaching these things in educational institutions since society has produced no credentials recognising the worth of 'love labour or solidary labour (the labour required to produce caring relations - supporting, encouraging, listening to others etc)' (Lynch 1989, p.151). In fact, competition between individuals is taught as a norm, as we have seen. There is a disincentive to care for or about those others if one's main aim is to win at the expense of others. Nevertheless, we are taught that there are areas of life where we should care: certification can be obtained in the so-called 'caring' professions - degrees in Social Work or Nursing, for example. There is no overt hostility to the idea of caring for others, but the 'hidden curriculum' - the way we teach - has a subliminal and profound effect on us. Methods of teaching are no different from those in other subjects even within the caring professions; and there is the same need to compete against other individuals for scarce certification and jobs.

Education must teach us *how* to care, *as well as* about the politics, economics, aesthetics and science of environmental problems if caring for the environment entails more than cost-benefit analysis and an understanding of technology, as we argue it does. Education must teach us to accept that others, though different from ourselves, have a point of view which is valid from their perspective. If we are to have a sustainable society that is democratic, education must give us practice in decision making and autonomy, more practice in teamwork and less in competition between individuals.

To summarise this section, even more than the actual content of educational courses, the way we teach them is influenced by and has an enormous influence on the sort of society in which we live. The influence of the process of teaching lies to a large degree in the fact that, because we are often unaware of the effects of how we teach, these effects are insidious and lead to behaviours which are unquestioned because they are taken for granted. Likewise, these habits are reflected in numerous areas of education because we take habitual ways of relating to each other for granted. The way we teach reflects the values of the society in which we live. Many of these values need to be examined and modified if we are to bring about a more ecological paradigm, one in which we identify more closely with our environment.

Future practice

Environmental studies encompasses an idea of 'the environment' which is far broader than merely the physical world which exists outside ourselves. It recognises that human beings, and the social, political and economic arrangements we make, are as much part of the Earth as anything else we may call 'the environment'. Whilst our educational system has done a remarkably good job of teaching us *about* the environment that is outside ourselves, it has put little emphasis on human influences and it has not recognised that 'the environment' (including human beings) operates as an interconnected whole.

Environmental studies (at least at the University of Adelaide) makes three main assumptions about education and the environment. These assumptions are not exclusive to environmental studies, but they are useful statements against which to measure our teaching practice.

- (1) that human beings and their social, political and economic arrangements are part of the environment, but that any physical environment is more than just the immediate elements of which it is composed and which influence it;
- (2) that the question of value is overt and inescapable;
- (3) that the *process* of learning contributes to our understanding of the world, probably as much as what is taught. Likewise, the way in which we go about solving problems contributes fundamentally to the sort of solutions we devise.

I Holism in environmental studies

To illustrate the **first** assumption, let us consider how a major river which passes through several countries or legal jurisdictions might be studied. It *could* be made a case study in several different disciplines familiar in schools and universities. It could be a part of physical geography; of history; of zoology; of botany. It might form a basis of study for political scientists or

sociologists, or for law students or engineers also. In fact, until recently, major river basins have been not been studied as a whole in such ways and this, we believe is one of the reasons they have largely been ignored in practice. Commissions such as the River Murray Commission in Australia and the Danube Commission in Europe have existed (since 1916 and 1948 respectively) but, until recently, have been concerned with such specific issues as the magnitude of river flows, flood control and freedom of navigation but not with broader management or environmental issues. (See, for example, Westing 1989)

In contrast, environmental studies requires students to look at rivers and river basins as functioning wholes, in ways not constrained by disciplinary limitations. Topics such as pollution, resource allocation, land degradation, and ecological protection, do not fit easily into the framework of traditional disciplines, but do require that we consider the science, the economics, the legal aspects, the politics, ethical concerns and so forth *simultaneously*. This concept goes far beyond ecology, which would look at the so-called 'natural' systems of rivers, but not the human influences on and uses of them. The study of pollution is not just the physics and chemistry of polluting substances and their biotic effects. It includes consideration of the economic and social causes of the pollution as well as its industrial origin and asks how pollution is defined, measured and controlled differently by different social and political groups. It considers the value of the river to all its inhabitants and dependants (both human and non-human) and hence provides a wide picture of what pollution of the river means (often a subjective measurement) as well as just the particular origins, effects and methods of cleaning up and preventing any particular form of pollution. One might say that environmental studies looks at a river in its totality when considering these topics. That is, it adopts a **holistic** approach.

Exactly *how* to teach complex issues in their totality is a vexed question. Indeed, it would seem to be beyond the capacities of ordinary human beings since, on the face of it, it would require knowledge from so many different fields. Many environmental studies teachers might find the prospect daunting, however enthusiastic they may be to educate for the environment. It is one purpose of this paper to suggest ways in which this holistic type of learning and problem solving *can* take place. Teachers of environmental studies need not be burdened with the impossible task of knowing everything about everything. Our role will not primarily be to impart knowledge, but to present problems and facilitate solutions. (This is also a change in *process*.)

For example, simulating a conference or a meeting of experts which involves students in negotiating possible solutions to a real-life problem gives them experience in participation in environmental problem solving and is also one method of holistic teaching. Such simulations also illustrate the need for and give practice in cooperative, multidisciplinary and interdisciplinary

approaches to solving environmental problems. They are also a very efficient means of promoting learning of the factual material necessary to understand and develop solutions.

One of the simulation exercises the authors developed to begin to put into practice our vision of environmental studies at the University of Adelaide as a 'terrain of contestation', concerns the major system of dams, diversions, hydroelectric stations and associated works on the River Danube between Bratislava in Czechoslovakia and Nagymaros in Hungary which was started in the 1970s, subsequently suspended and is now partially completed, but in a very unbalanced manner. Austria has paid for much of the engineering works and wants the promised electrical power as recompense. Slovakia, flexing its independence muscles, wants to complete that part of the scheme under its control, partly because of the navigational and, therefore, economic benefits which will accrue and has developed its river port of Bratislava in anticipation. (It will also get some of the electricity in due course.) Hungary wants to extricate itself from the scheme but cannot afford the compensation which has to be paid to Austria and Czechoslovakia (or now, of course, Czechoslovakia's two successor nations). It claims the scheme is an environmental disaster primarily because of threats to the riverine ecology and to the purity of one of Europe's largest reserves of ground water which lies beneath one of the proposed dams and on which Hungary depends for much of its drinking water. If the upstream part goes ahead without Hungary's cooperation and the completion of its part, the environmental damage would probably be even worse. (For brief reviews of the environmental consequences of the dams and their political context see Perczel & Libik 1989, Thorpe 1984 and Waller 1992).

The story of the Danube dams is set in the context of the development of Western Europe as a whole and the development of a continuous navigable waterway from Rotterdam to Constanta on the Black Sea which was finally completed only in 1992. The Danube itself flows from Germany to the Black Sea through (currently) 8 nations. Major political changes have, of course, taken place in the region over the last few years, including the breakup of Yugoslavia and Czechoslovakia. The total change of political ideology in these countries and in Hungary means that the original agreements were signed by governments which are now either totally discredited or non-existent, using political and economic ideas incompatible with those of the current regimes. The desperate economic circumstances of Eastern Europe add to the region's difficulties. Other complicating factors include severe environmental damage as the result of burning the low quality, high sulphur coals of this part of the world and the environmental problems surrounding the development of nuclear power. These and other factors have contributed to unusually powerful Green movements. This issue shows, amongst other things, that renewable forms of energy such as hydroelectric power and apparently environmentally benign forms of transport such as by river barge

might also give rise to considerable environmental problems. Obviously, the issue of the dams is one of enormous complexity and is not easy to teach holistically.

However, simulating a conference to examine particular problems such as this can expose students to the multidimensions of the subject and be a vehicle for introducing the transdisciplinary and holistic nature of environmental studies. A simulated conference can also embody some aspects of teaching *for* the environment. This means that it can involve not only teaching holistically but also the clarification and examination of students' own values and the values that underpin the decisions that have led to the problem being examined. In addition, the simulated conference suggested is also a different *process* of teaching which has the potential for normative change. These concepts will be examined in more detail below.

II The role of values in environmental studies

The second assumption of environmental studies- that the question of value is both overt and inescapable - must be explained. We have mentioned that environmental studies can embody aspects of educating both *about* and *for* the environment. 'Educating *for* the environment' is a value-laden phrase. Education *for* the environment, by definition, means education in defense of, in support of, or in favour of the environment. Therefore, it assumes that the environment is worthy of defense, support or favour, and in fact puts this as its primary goal.

This is not the sort of thing which liberal or conservative approaches to formal education, at any level, ostensibly set out to do. Most of the stated goals are very individualistic, concerned with the development of each individual human being as a healthy, fully developed person with those intellectual abilities and practical skills necessary for them to take their place in a functioning society. The consequence, of course, which is not usually stated explicitly, is that the present functioning of society is thereby maintained and enhanced. In other words, what are stated to be individual goals and individual values are, in fact, corporate and societal. Even when community values are put forward as goals of education, the result is often problematic. The draft statement on 'Studies of Society and Environment for Australian Schools' released for consultation in November 1992 makes this clear. It says (p.6)

Throughout their studies of society and environment, students ...
develop the shared values which cluster around the concepts of
democratic process, social justice and ecological sustainability.

Recent very sharp not to say acrimonious debates about 'sustainable development' and its surrogates including 'ecologically sustainable development' and 'ecological sustainability', the particular version of the

phrase used here, show that Australian society is far from experiencing fully 'shared values' in this case. Concepts of 'democratic process' and 'social justice' are also far from universally agreed upon.

However, it is essential that human beings have in-depth knowledge of the workings of the world we live in and that we have some practical skills to utilise or change these workings and thereby maximise individual and community health and well-being. However, intellectual or technical skills are not by themselves sufficient to result in maximal social welfare, nor in an ethic that will protect the environment, yet the authors believe that the environmental imperative demands that we adopt the overriding principle of protecting the Earth in everything we do. (Our reasons for believing this are essentially anthropocentric. That is, we believe that human well-being will be impossible to achieve without also improving the well-being of our environment. This position is explained more fully in Dyer & Gunnell 1993a) In other words, the place of value in environmental studies is not only inescapable, it must be made explicit.

There is another way in which the question of value is an inevitable part of environmental studies. Environmental studies involves finding environmental **solutions**. It is about problem solving. Environmental studies students are required to start out from the acknowledgement that particular environmental problems exist which need to be solved, rather than having as a starting point that a piece of knowledge needs to be acquired, or that some theory is valid because it fits into the corpus of the rest of the theories of that particular discipline. Yet human beings cannot solve problems without some criteria for deciding between different choices. The different choices we make reflect our different values.

Take the question of drilling for oil in the Great Barrier Reef region, for example. Before the Reef was declared a Marine Park in 1975, much argument took place between the Queensland State Government and conservationists. The values of the State Government were reflected in the then Premier's statement. 'If Queensland were to become self-sufficient in oil, our development and prosperity would be fantastic. Think of the benefit to both our national economy and defence security' (Wright 1977, p.69). Conservationists, of course, put other values before this method of attaining economic prosperity. They claimed that the well-nigh certainty of a major catastrophic oil spill and the inevitability of continuous, insidious, if low level, pollution resulting from oil drilling practices would eventually destroy the marine ecology of the Reef. They believed that, because of its enormously high biological diversity, the Reef was a national (indeed, international) treasure, valuable far beyond any monetary income that oil would bring. If the ecology of the Reef were damaged, there would be other most severe environmental consequences. At the time that this major controversy was ongoing, many argued that humans have no right even to put the Reef at risk, let alone initiate developments which would, in their view,

almost certainly destroy it and its associated life forms. Others argued that the Reef could provide economic benefits in quite different ways such as tourism and fishing and that the oil which might be obtained was unnecessary as well as dangerous. Deep ecologists have yet another viewpoint: that the intrinsic value of the Reef and all that live in, on, under or near it must be respected. Humans should not *use* the Reef at all.

The question of drilling the Reef has, happily, been settled. So far as anyone can be certain of these things, it will not happen. Nonetheless, other environmental tragedies which may be even more drastic are looming: uncontrolled tourism, uncontrolled fishing, industrial development on its fringes and inappropriate agricultural practices on the adjacent mainland. Solutions to these problems will only be found by deciding between the different criteria that inform people's different values.

For these sorts of reasons, environmental studies is inevitably at the centre of ideological disputes of the fiercest kind. Educators *for* the environment must, by definition, introduce value into the debate, although it is not the role of environmental studies to preach a particular set of solutions. Rather, this role is to expand the space which is normally allowed in the educational system to explore values, to try to understand what sort of values lead to what sort of environmental solutions.

In an attempt to create this expanded space, the authors have devised a number of activities including one on managing the Great Barrier Reef Marine Park and another on how to deal with an economically valuable but potentially environmentally dangerous nickel refinery close to it. These and other activities, described more completely in Dyer and Gunnell (1993b), force the students to consider and become actively involved in presenting competing and conflicting interests in sensitive environmental areas and issues.

One activity which brings out very clearly the social and political context in which our values are formed is on the topic of flooding in Bangladesh, one of the most flood prone countries in the world. The floods are due partly to peaks in the Ganges and Brahmaputra Rivers, the deltas of which cover a large proportion of the country, and partly to massive storm surges in the Bay of Bengal into which the rivers flow. The impacts of these two types of floods are different for different peoples in Bangladeshi society. There are, broadly speaking, two different solutions to the major environmental problem of flooding. One solution, which basically tries to *stop* river floods altogether, involves mighty engineering works and would cost billions of dollars. It would be the preferred solution of a proportion of city dwellers who are undoubtedly inconvenienced by the river floods. However, the prevention of river flooding would have a quite different set of outcomes for the majority of the population, who are dependent directly on the rich deltaic soils for a living and who have adapted their way of life and agricultural practices to river floods and the new soil they bring every year.

The other solution, more attuned to *their* needs, sets out to *manage* floods. It involves low technology, would cost less, and would have a different set of outcomes. The people who *take* the decisions are likely to be city people whose financial and other interests are affected by the *river* floods. If the money (mostly in the form of external aid) is spent on big river engineering works, there will be precious little left over to do anything much about the coastal floods which can be totally devastating in terms of human lives lost and against which some engineering works, plus efficient advance warning schemes and so on, can be effective. Fuller descriptions of the problems and the various steps which have been proposed and which have actually been done to prevent some of the flooding are described in Bingham (1989) and Boyce (1990).

The activity we have developed involves deciding which would be the better solution and just what the word 'better' means in this context. It also raises questions such as 'better for whom?', 'who would pay?', 'how would this affect the livelihoods of the people who rely on low level flooding?', and 'how would this affect the ecology of the rivers?' Different students will answer these questions in different ways depending on their own values. Other questions which can be explored concern the role of international aid and aid organisations: should 'aid' be given at all? How far should aid giving countries determine how the aid should be used? What priority should the saving of millions of Bangladeshi lives have vis a vis environmental conservation in Australia?

The parameters of the values debate within environmental studies are very wide. The following are typical of the fundamental questions which might be raised:

Should our main concern regarding environmental change and degradation be the effects on human beings and their society? Should the integrity of the environment itself be of prime concern? Humans are only one species among millions on this earth. Should they therefore have no more rights or interests than any other species (or perhaps any other sentient species)?

How far should compulsion determine environmental outcomes? For example, the inequitable and inefficient use of non-renewable resources has been identified as producing environmental ills. Since the USA is by far the world's largest user of non-renewable resources, should it be compelled to use less? (This, of course, raises the question of who would compel the USA and how!)

How are we to identify the community's interest? How should the varying and often conflicting interests of different sections of the community be reconciled? How far should freedom of individuals and of particular sections of the community be curtailed if the exercise of that freedom would entail degrading the quality of the environment for the whole community?

The USA and Australia are two of the richest countries in the world, but 40 million people in the USA and more than 2 million people in Australia are said to live in poverty. In Third World countries 80 or 90 per cent of the population live in poverty. Durning (1990, pp.144-145) wrote 'Most of the world's looming environmental threats ... are by-products of affluence. But poverty drives ecological deterioration when desperate people overexploit their resource base, sacrificing the future to salvage the present'. If poverty is indeed contributing to environmental degradation, should wealth be redistributed? What would be required to persuade First World countries to share their wealth and resources with Third World countries?

Bearing in mind the Bangladesh example, who should have control of aid projects, environmental protection projects and wealth transfer projects?

Many claim that First World countries, having already exploited many of the natural resources of the Third World, now wish to claim rights over resources such as genetic material in rainforests. How far can the First World's push to protect the world's rainforests be interpreted in this way?

What are the differences, if any, between the way that women and men treat the world? How far are our current environmental problems the result of a patriarchal, sexist society?

How far is human overpopulation a contributory factor in producing environmental ills? To what extent can and should human societies be compelled to limit population growth? Should there be different rules for First World countries, which have a relatively low population growth, from Third World countries, which have a relatively high one? How, in any case, should population growth actually be curtailed?

To what extent should consideration of future generations influence our decisions about the environment? How far into the future should our consideration extend? On what logical or scientific basis can predictions about the medium term and long term future be made? How can we develop social and ethical criteria for evaluating them? How can we possibly make decisions about the environmental preferences of people not yet born?

Who should decide all these questions?

The role of values is acknowledged in environmental studies and so can be debated, as these questions demonstrate. This is not the case in formal education in most other disciplines. Environmental studies requires students to distinguish 'the pure from the polluted, the natural from the artificial, the noble from the mundane, good from bad, and right from wrong' (Sagoff 1990, p.22) in order to be able to set priorities in solving environmental problems.

Clearly, human beings have differing ideas of what might constitute a right, wrong or optimal solution. At times, choosing the optimal solution will

mean opposing present government policies. There is no denying that educating *for* the environment challenges many of the cherished beliefs of our society.

III The process of learning

This brings us to the **third** main assumption of environmental studies - that the **process** of learning and how we go about problem solving are vitally important. Giroux (1981) argues that in schools (and other formal educational institutions)

- (i) knowledge is socially constructed through the interaction between students and teachers, and
- (ii) the social order is legitimated and reproduced through the production and distribution of 'acceptable' knowledge and classroom social process.

In Giroux's view it is the dynamic between these two processes that constitutes the struggle for 'cultural capital' (Giroux 1981, p.3). That is, students and members of the community, including teachers, wage a battle through these two processes between the reproduction of society's dominant ideology and the creation or production of any alternative ideology. Therefore, changes to the processes of teaching and learning may constitute part of the solution to environmental problems.

With this in mind, it was decided to examine the process of teaching in the some of the courses at the Mawson Graduate Centre for Environmental Studies. As a result some changes were effected. In particular, greater use was made of simulations and other participatory activities, which are seldom utilised at this level of education. Dukes & Seidner (1978) suggest that there was an increased utilisation of educational games and simulations in schools during the 1970s, mainly as a result of increased questioning at that time of the socialising role of schools. The debate has not, of course, ceased even if the use of simulations has lessened. Although simulations are not new we believe that learning by this and other active participation methods constitutes a radical alternative to the normal teaching process since it creates different relationships between students and between students and teachers. Simulations and other participative learning activities also have the potential to clarify the relationship between the factual curriculum and the affective curriculum as we will argue below. At the least, this process of teaching would, as discussed, enable students to participate in solving real environmental problems, albeit within a simulated environment, and give them practice in a variety of skills that are essential for environmental problem solving.

Active learning implies the direct involvement and participation of the learner in the learning process. The Australian Oxford Dictionary's definition of the word 'passive' helps clarify this further:

'passive' : acted upon, not resisting, submissive, lacking initiative or forceful qualities, inert.

To some extent, this is the way students are expected to behave in conventional learning situations in our society. However, teachers are not passive. Teachers are powerful figures in relation to the students in a class. They have in-depth knowledge in a particular area or areas and expect to impart this knowledge in discrete parcels to their listening class of students. They are also empowered to judge the competence of students in relation to each other, and to grant or withhold certification at the end of the course.

However, teachers in active learning programs have a different role because the learners are actively involved in the learning process. Teachers do not need to be purveyors of all possible information impacting on the problem under consideration although environmental problems require the application of knowledge from a variety of disciplines. The teachers' role, rather, is to present the problem and act as facilitators for the students to acquire from various sources whatever knowledge might be necessary for solving that problem and to assess how far any individual student's work contributes to the group solution.

Active learning implies that learners are autonomous agents that command respect, both from the teacher and from each other. It implies a levelling in terms of status, but diversity of ability. As Jones (1985, p.115) says in relation to designing simulations,

(there is) an overriding philosophical concept implicit in treating learners as human beings who are in charge of events. To grant power and responsibility is itself.. .an act of politics involving government... it is a transfer of power, a token of respect, an appeal for honour and consent, a gift of democracy, and a request for the acceptance of duties and responsibilities.

Within the limits set by the activity, active learning allows students to be in charge of events, and to have full authority and responsibility for the course of events, not as individuals in charge of or with power over other individuals, but as part of a group. To influence group decisions, individuals need to learn to deal effectively with other people. They must learn to bargain, to persuade, to compromise, and to accept responsibility for their actions. People rarely have a chance to develop or practice these personal and interpersonal skills in a safe learning environment, yet a truly democratic society in which communities are able to take control of and responsibility for their environment would require these skills to be taught.

Adulthood in Australia requires people to vote at elections. Citizens may become members of parliament at eighteen. Therefore, representative democracy demands that we are able both to assess an argument and to argue

a case. Unfortunately, most people arrive at adulthood with little or no ability to do this. The Australian Senate Standing Committee on Employment, Education and Training received 135 submissions, including oral evidence from 68 witnesses, on which it based its report, *Education for Active Citizenship* (ASSC 1989). The submissions cited in the report point to the widespread perception and belief that Australia's education policies are leading to a society of 'technologically trained, but politically illiterate, young citizenry' (ASSC, p.8). Whilst we do not concur with all the conclusions the ASSC draws from the evidence presented to it (mainly because the ASSC is concerned only with the reproduction of the existing model of democracy in Australia, rather than with creative teaching for more participative and personally rewarding models), we do agree that few people, young or older, have a clear idea of the political system within which they live. Few people, we contend, are able to explain their point of view to a group clearly and succinctly. We would guess that even fewer are able to bargain or negotiate in situations of conflict so that they achieve, as far as possible, the satisfaction of their own interests as well as the satisfaction of those of others. Fewer disputes would come before our courts, surely, if people were able to negotiate satisfactorily. Simulations are one of a variety of active learning exercise which we have developed in order, among other things, to provide practice in these skills.

Jones (1985) argues that, in a simulation, there is reality of function within the simulated environment. Thus, participants do not 'play' or 'act', but actually carry out the job to be done, or solve the problem set up by the simulation. The emphasis is on understanding the simulated environment in order to carry out the function imposed by the participant's role. Therefore, the simulation is a real social experience. In carrying out their function in the simulated environment, people develop a belief in their ability *actually* to exert some control over that environment whilst learning some skills necessary to do so. They develop a sense of efficacy which, it has been found, is transferrable to other aspects of life (see, for instance, Dukes & Seidner 1978, p.26). When environmental problems are seen as overwhelming, people often respond with frustration, anger, helplessness or apathy. To counteract this it is vitally necessary for people to learn that they themselves can develop strategies to influence the course of events.

In simulations, the recreated reality may be different from students' preconceived ideas of what that environment is like. Their sympathies are often changed when they adopt the role of 'developer', say, and are given some of the information, objectives, constraints and achievements which influence developers' behaviours. They are more able to empathise with developers, and to recognise that, to some extent, people's attitudes are shaped by the real life roles they play; that the decisions developers make about the environment reflect the logic of the interests of their corporate position. Recognising others' interests is a first step in the process of finding

a win/win solution to problems. Contrary to Trudgil's (1991, p.45) assertion that 'simplistic role-play' perpetuates conflict and entrenched attitudes, we suspect that the experience works towards more tolerant student attitudes.

Another problematic area in any problem solving process is the initial definition of the problem. Several authors (eg Trudgil 1991, Bardwell 1991) have identified this as a priority in environmental education. According to Trudgil (1991), it has been the lack of a clear identification of the precise nature of environmental problems, their causes and sources, which has stopped us solving them in the past. Bardwell (1991, p.605) sets out five different stages involved in any problem solving effort:

- 1 building an understanding of the problem: defining the problem space;
- 2 establishing some initial criteria for the goal;
- 3 searching for solutions;
- 4 deciding among solutions;
- 5 evaluating progress: comparing initial goals to, and monitoring, the solution.

Of these, the first, identifying the precise nature of the problem, has the most profound effect on the quality of the solution. This is particularly obvious for environmental problems which were often defined only in scientific or technical terms in the past. Although the social, political and economic dimensions of problems are usually included these days, there are still difficulties.

For instance, the definition of the problem is a problem in itself in the simulation which we have developed about flooding in Bangladesh. Do the people of Bangladesh need to prevent flooding? Is the problem, rather, management of flooding? Is it poverty, or is this too general? Quite obviously, the problem definition guides the strategies and actions taken to address it. As Bardwell points out, 'the issue is not that one vantage or definition is necessarily the best... Rather, focusing on different aspects of the problem... simply makes us aware of the options and encourages more thoughtful analysis' (Bardwell 1991, p.606).

It is only rarely in formal education that we get the chance to discuss problem definition. More often than not, there is no question but that the problem is as the teacher has presented it. Some of the simulations devised by the authors present the opportunity for students to practice the skill of defining problems. The discussion generated is also helpful practice in those 'ordinary virtues of inquiry and deliberation' mentioned earlier, which are so necessary if the question of value is to be reintroduced into the environmental debate.

However, there are some ways in which simulations and other active learning exercises are problematic. Firstly, any simulation or other active learning activity has embedded within it a set of values which need to be made explicit. As with all forms of curriculum, values pervade the content, structure, form and process of the activity and it is not always easy to be clear about the value assumptions made either by ourselves or others as authors. Particular care should perhaps be taken with pre-packaged curricular material, although some might argue that it is harder to uncover our own value assumptions than those of others. In either case, students should be involved in the discovery and critique of hidden values in their curriculum.

Secondly, simulations and other active learning activities do not necessarily in themselves teach in any systematic way the physics, chemistry, biology, sociology, economics, history, etc. of the problem. Some 'facts', of course, have to be included in the background briefing to the exercise, partly because assessment procedures set by educational institutions often require students to display a knowledge of such 'facts'. Active learning, in the authors' view, often encourages a more in-depth and self-directed investigation of the background to a problem. In our experience, students who become emotionally involved with their role are sometimes motivated to carry out investigations to support their case, or to disprove someone else's. However, the objective of these activities is not to teach 'facts' or 'theory' as if they exist as objects waiting to be discovered. The objective is to put 'facts' and 'theory' learnt elsewhere into a value laden context and to make clear that knowledge is socially constructed, in fact that the class and teacher are themselves creating knowledge by their activities. We do need to understand appropriate areas of the biological and physico-chemical sciences and of how human activities have changed the environment in order to deal effectively with environmental degradation. However, a deeper understanding of the relationship between 'facts' and our socially constructed value systems will, we believe, be necessary for a sustainable *future* for human beings.

Another shortcoming of most simulations is that they only deal with conflict at the stage where interested parties have reached the negotiating table. They do not deal with the process of decision making that has led to the selection of which interested parties become involved in the negotiations. Consequently, they tend to present an unrealistically egalitarian, pluralistic picture of society. One way of overcoming this problem is to design further activities to demonstrate in practical ways the different sorts of solutions that are reached when particular parties are either included or excluded from a debate.

Conclusion

This paper has argued that the Western industrial culture which endorses a positivist, mechanistic and reductionist world view has given rise to the environmental crisis in which we find ourselves and that this has been

reflected in every aspect of our formal educational system. The paper assents to the view argued by Giroux (1981) that the curriculum (including the 'hidden curriculum') offers the potential to bring into existence an alternative world view through the very institutions which otherwise tend to reproduce the dominant (positivist) paradigm.

Although environmental studies teaches *about* the environment, the paper explores ways in which simulations and other participatory activities can contribute to a form of teaching that recognises more subjective experiences and puts 'facts' into their value-laden context. In other words, the paper presents an initial exploration into how environmental studies can be taught as education *for* the environment. This process is by no means complete, but a start has been made to debate social values as part of the formal educational process in environmental studies at the University of Adelaide.

The challenge for environmental studies, as we see it, is not simply to teach concrete facts about the environment, nor simply to teach these in a holistic way. It is to create a *process* of learning which itself sets up and lives out alternative values for consideration and provides opportunity for values to be debated. The challenge lies also in discovering with students ways in which science is socially constructed. At the same time we would wish students to retain a respect for a science and scientific method which can contribute to human well-being and enable humans to respect and care for the environment. There is also the practical challenge of motivating students who have reached the zenith of a highly competitive educational system to cooperate to find solutions to environmental problems. This paper suggests some possible ways of meeting these challenges. Environmental studies teaches *about* the environment, but it can do so in ways which recognise the potential contribution of curriculum to social change.

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