INFLUENCES ON
THE DEVELOPMENT OF VALUES AND BELIEFS
OF STUDENTS IN POSTGRADUATE ENVIRONMENTAL EDUCATION

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The paper first reports on a small enquiry which is part of a larger program, the objective of which is to revise some methods of the postgraduate environmental education in the Centre in which the authors work. The subject matter of this paper could, if such a word existed, be described as a 'trialogue'. The word 'trialogue' is used because this project involves what seems to be a three-way interaction between the authors as teachers, leaders or facilitators, and students on the one hand and what will be called 'professional environmental educators' on the other.

At the moment it is, perhaps, an incomplete trialogy since although the authors have a dialogue with their students and are also engaged in a dialogue with 'professional environmental educators' - this paper and others being part of such dialogue - the gap between students and 'professional environmental educators' remains as yet unclosed.

In introducing this paper in this way we have quite deliberately raised a
number of contentious concepts, as well as made a number of apparently
dubious assumptions. Our purpose in doing so is to create debate on these
points. In his chapter in Environmental Education: Practice and
Possibility, Robottom (1987) rightly criticises the conventional model of
educational reform in which 'educational theory' is in the possession of
professional education researchers who pass on their findings to be applied
by teachers who, at least before being given these findings, are engaged in
'atheoretical', largely practical activities. He supports an
interactionist view of the development of educational theory in which
knowledge is "an interplay of the individual's subjective views on the one
hand and the social, cultural, historical and environmental context in
which the individual lives on the other" (Robottom 1987: 107). Robottom
argues that separating off the teaching role from the researching role
ignores the fact that all teachers must always have some theoretical basis
on which they work (even if it is implicit and largely unrecognised by
them) and that gaps between theory and practice can occur at all levels of
environmental education activities, and is not simply the failure to
translate theory derived from research into practical teaching in the
classroom.

This paper attempts to point to and suggest means for trying to plug two
such gaps which the authors have identified from their own educational
practice. The first is that part of the missing trialogue we referred to
earlier, that is, genuine communication between students or learners, and
researchers. Because of this it was necessary to discover what the
postgraduate students at the Mawson Graduate Centre for Environmental
Studies (MGCES) identify as influencing their environmental awareness. Who
or what led them to enrol at a university and pursue their environmental
education formally? As we will demonstrate, the information obtained is
important both for the theory and practise of environmental education.

A questionnaire was used (as well as other means of information gathering)
and, to that extent, the object was to seek

warranted propositional knowledge (to a large extent) based on quantitative
data - about teachers, learners, subject matters ... and various
interactions among them"
(Gough 1991: 2 quoted in Robottom 1992: 137)

As may be apparent from perusal of the questionnaire given as an Appendix
to this paper, the approach was one of applied science. Indeed, the data
were originally gathered as part of a wider project testing a specific
hypothesis concerning the spread of environmental knowledge in the
community. Nevertheless, this whole exercise can now be seen as more of a
means of formal communication between the students and the authors as their
teachers and also between students and professional environmental
educators, since the questionnaire and other activities are very much about
the process of improving formal university teaching.
This brings us to a second use of the word 'trialogue' and a second theory/practice gap. University academics have roles as teachers and researchers, but their research role is assumed and encouraged to be within the specific 'discipline' or subject in which they work. Indeed, it is part of their conditions of employment that it shall be so. It is commonly stated (although the authors are ignorant, not necessarily disbelieving, of any research findings which support this assertion) that the most active in research make the best teachers. But if, as in the authors' own case, it is necessary to keep abreast of research findings in such major environmental problems and issues as climate change, ozone depletion, global deforestation, loss of biodiversity, and the international means of addressing these, as well as the strengths and weaknesses of the scientific and economic arguments concerning their progression and abatement, there is precious little time to address any role which indubitably would be necessary as an educational researcher. The trialogue which should exist within ourselves as teachers, disciplinary researchers and educational researchers exhibits gaps.

Many scientists partly, perhaps, because they are busy enough doing research, have not (or will not) consider that their research is essentially making value-laden additions to subjective knowledge. For them to be told that their teaching, as teaching, is value laden might both surprise and antagonise them. As an academic in Environmental Studies the senior author of this paper finds that his own problems are almost the converse of this. He is attempting to teach explicitly for the environment (although he recognises that the constraints of the university system, amongst other things, locates his teaching practice in the liberal, about the environment tradition). He has students, on the other hand, who are committed to values which are at least similar and often more explicit, more committed and more extreme than his own. Many of them are already teachers in formal educational institutions, most will be 'teachers' or proselytisers in their workplaces or in community action groups. The educational dynamic is complex to say the least.

As teachers we recognise the need for effective and overtly committed educational practice. Filling this particular theory-practice gap, the completion of this particular trialogue, may only come from structural/institutional rearrangements within universities involving such things as the appointment of educational specialists to disciplinary based departments. However, the empirical data which are provided by this small project, and the institutional arrangements in which they were gathered and within which their significance must be assessed, are, we believe, a potentially important part of the debate concerning the way forward in Environmental Education.

Purpose and Process in Environmental Education

The purposes of Environmental Education include most of those of education
generally, viz:

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the provision of training for particular tasks in society (hard and soft vocationalism);

the moral and intellectual development of individuals for the good of themselves and thus of society in general;

the planning and, above all, criticism of society;

the provision of something which is both good in itself and which by its possession and widespread existence can achieve a greater degree of equity and equality within our society.

The extent to which these purposes are emphasized within different spheres and levels of education and different subjects varies enormously. And even within any one subject the emphasis which is given will vary from time to time in different parts of the curriculum and pedagogic process. But they probably all are present in our formal educational structures although the last purpose in the above list is of fairly recent appearance and would no doubt be contested by some as a rightful purpose of education.

The fact that vocationalism is among the earliest purposes of education to be recognised and institutionalised is at least a part of the reason why current 'disciplines' are arranged as they are in schools and universities - physics, geography, French, engineering, economics and so forth. Hence, although we strongly believe that vocationalism has an important part to play in Environmental Education, there are strong pressures for it to be included within the conventional disciplinary format of what are claimed to be 'relevant disciplines'.

Environmental Education adds at least one other purpose to the list above; the development of an environmental (or is it ecological?) consciousness among learners in order to change values, attitudes and behaviours in ways that will save our environment. Precisely what that consciousness is and how it might be imparted is, we believe, a vibrant part of current debate in Environmental Education. But the addition of this further purpose has implications for the range and type of disciplines which are appropriate for any level of education at which Environmental Education might be offered.

This paper is designed to present some empirical observations and some conceptual ideas as to how this additional purpose might be included within Environmental Education, given that the teachers and their students are all environmental learners (in the sense that all of their education hitherto has been fragmented, materialist and supposedly objective and they are now trying to develop holistic ideas which are for the environment) and that they are obliged to operate within institutional frameworks which are
unsympathetic, to say the least to, almost every aspect of Environmental Education and resistant to innovation generally.

We begin with some empirical observation or assertions which suggest some of the practical difficulties which must be overcome if Environmental Education is to be established in a way which allows this additional purpose to be realised.

First, Environmental Education is new, dating from the early to mid 1970s at the earliest, with the UNESCO International Environmental Program of 1975 providing a convenient starting point. Its teachers therefore for the most part do not have the sort of history, status, readily transmissible practical skills and resources available to teachers of most other subjects.

It should be, although for understandable reasons it often is not, avowedly and explicitly value laden. How can it be so, firstly, when the objective of so much education at the present time is to provide allegedly value free knowledge (but in fact is implicitly laden with values in opposition to those for which environmental education stands); and, secondly, when it is the youngest subject of them all and is seeking to gain a place in an already crowded curriculum? Under such circumstances, the last thing which Environmental Education wishes to be seen to be is polemical and controversial.

It should be, although again for understandable reasons is often not, holistic in outlook and in practice. How can it be so when every other department in school or university is established as and functions as part of a world view fragmented into physics, geography, history, economics, etc?

Environmental studies is unbounded (not quite the same things as holistic) in ways which few other subjects are. The distinctions between physics and chemistry, say, or between history and politics, psychology and psychiatry, may be blurred but are recognisable and recognised by all concerned in these subject. But where is the boundary to the environment? Are there any subjects, apart from perhaps the further reaches of cosmology, atomic physics, ultra molecular biology and one or two others, which are not relevant to or part of Environmental studies? How can a curriculum be developed for such an unbounded subject: and how, in trying to do so, can damage to the sensibilities of dedicated zoologists or geologists, lawyers or economists who believe they already cover 'the environment' possibly be avoided?

Environmental Education has been established from kindergarten to postgraduate to varying degrees as a response to major concerns over the health of the planet in which we live, the sort of world and level of resources we are going to leave our descendants, and our treatment of
fellow living things (human and non-human) on the earth. It challenges the way we humans organise our social and individual lives and our view of the uses to which we can put living and non-living things on the planet on which we live. In other words, in educational terms, it challenges the accepted doctrines or ideologies of many already established subjects such as economics (rejecting continued growth, demanding the revision of concepts such as GDP, pressing for the inclusion of 'externalities' into Environmental accounting, for example), traditional politics (by arguing that the traditional differentiation between left and right is now irrelevant), ethics (arguing that our ethical concerns should be extended to animals, plants, ecosystems, the whole planet perhaps), and much else. Our changing views on our environment are, as has often been pointed out, a combination of the Copernican and Darwinian revolutions occurring together and so it is hardly surprising that educational processes which try to come to terms with them and spread them in society should be controversial.

Because it is concerned with interrelationships between people and their environment and people and other people it is a form of education which is as much concerned with educational process as formal subject matter. That itself is a relatively new idea.

The Institutional Responses

The environmental crisis (or at least common perceptions of it) may have burst suddenly upon us with the publication of Rachel Carson's Silent Spring in 1962, with the oil shock of the 1970s, scares about nuclear fallout in the early 1960s, the first Sahel drought and so forth. The development of an educational response has necessarily been much slower but, for obvious reasons, is becoming ever more urgent. Numerous universities now have courses in Environmental Studies or Environmental Science at one level or another and in schools Year 11 & 12 subjects in the area abound. More are being developed. In the authors' state of South Australia the curriculum for a proposed new Year 12 SACE subject is currently being written, and an undergraduate degree in Environmental Studies at Adelaide University is under consideration. Teachers for these, and no doubt for other courses, will have to be found. The educational processes to which we subject these teachers may continue to have consequences for thirty years or more, so the current postgraduate Environmental Education is vitally important.

Environmental Studies began at Adelaide University in 1975. Its start was, in some ways, auspicious enough: the Foundation Director was appointed outside the Faculty structure, had no department to administer, had university wide responsibilities to coordinate and lead environmental research and scholarship throughout the university and had a brief to introduce a Masters degree in Environmental Studies open to graduates from all disciplines. (The early history of the project has been described by Young, Dyer & Taylor 1988 and Young 1991). In other words the subject and education in the subject was seen and treated as global, holistic,
unconventional and important.

The Foundation Director was an earth scientist and, although having a wide range of interests, skills and expertise, carried out much of his research within that discipline. He was also determined to build the reputation of the research done and the course he directed on conventional disciplinary criteria. He needed to, it might be added, in the face of considerable opposition and scepticism from within the rest of the university to what was being attempted. While the curriculum for the Masters degree was certainly multidisciplinary, in that it included contributions from biologists, lawyers, economists, mathematicians, engineers and others, it was also very reductionist and conventional. The emphasis was on the transfer of factual material in these established disciplines and the overall objective was environmental management. The reasons for this were also connected with the status of the award, but also because at this time there was little thought and analysis to suggest that it should be otherwise.

However, for reasons connected with status, resource allocation and administrative convenience a Centre for Environmental Studies was rapidly established which, within a few years, had become incorporated into the conventional Faculty structure and was, to all intents and purposes, just another university department. The unique vision and educational opportunity associated with the pioneering development of broad ranging interdisciplinary Environmental Studies within the university was lost and the consequences soon became apparent. Other departments in the university now run their own postgraduate awards in, amongst other things, Ecological Land Management, Environmental Law, Occupational and Environmental Health, Environmental Engineering, and many others. Things environmental have become disciplinary based again.

The Centre still exists and thrives, offering some some specialist subjects not offered by or appropriate to other departments in the university and, most importantly, four compulsory subjects avowedly holistic and transdisciplinary in structure and intent. But the original idea, the movement, the set of ideals and values which is environmentalism has been lost - its ethos, objectives and subject matter are now, at least according to the university hierarchy, little different from the rest of the university. Not only does this constrain us in the Centre in the ways that we can teach, the implications are not lost on our students, many of whom are themselves preparing for careers in Environmental Education.

However, during the time the Centre was being changed from outside, it was also changing from within in ways which we believe are mostly more sympathetic to the Environmental ideal. The staff, the curricula and the
students are all now markedly different from when the Centre was established. These changes have come about as a result of pressures from a number of directions. First and foremost, we believe, is the growing urgency of the Environmental crises themselves. At the time of the Centre's establishment, the first United Nations Conference on the environment had just happened at Stockholm, the first stirrings on Greenhouse, Ozone depletion, forest loss, land degradation and so much else were beginning; the first political and philosophical analyses of the environmental predicament were being written and activist organisations such as Greenpeace, Friend of the Earth, the Wilderness Society and the Australian Conservation Foundation were getting into their stride.

The first author of this paper, who was originally a geneticist, took over as Director of the Centre in the early 1980s and began, hesitatingly, to move towards more holistic, committed teaching. The fruits of a conventional scientific education and a research career in typically reductionist science were hard to shake off. Furthermore, simply keeping up with burgeoning environmental problems in order to pass on what were the apparent facts concerning them to students left little enough time for personal learning and synthesising new ideas about educational process and educating for the environment. Of the four academic staff now in the Centre, one (obviously a younger member) has a PhD in Environmental Studies, although his undergraduate training is still disciplinary. The others received their training and therefore absorbed their early environmental values prior to the establishment of the Centre. The adoption of a true holistic outlook is not easy. Nevertheless the nature of much of the teaching in the Centre has changed as a result of a number of things, many of which have already been mentioned:

- the changing nature and urgency of the environmental problems themselves.
- the gradual recognition of the unbounded nature of the environment and in particular its political and philosophical dimensions
- the recognition by the staff that their students have often had as much to teach as to learn, often in 'factual' terms but more often and more importantly in terms of their own knowledge and commitment to particular outcomes.
- the recognition that students in the Centre, as formal or informal educators in school, college, workplace or community when they graduate would face not dissimilar problems to those the staff of the Centre had faced within the university and that if it were desired that they should teach holistically, for the environment, to respect their students and colleagues sensibilities and so forth, then that is how they themselves should be treated.

In other words, the teaching staff in the Centre claimed to have developed or at least to be developing their own environmental consciousness and values and were and are claiming that they could develop appropriate
methods for passing on those values to their students. But the staff themselves are learners in this respect and many of their students are ahead of them. One of the questions for the staff to have answers to as teachers is from where are their students coming? Why are they undertaking the courses? What is their preexisting knowledge and what are their values? In a more general sense how are environmental ideas and values being transmitted through the community? The point is that if it is important for teachers to know the answers to these questions in order to carry out their educational function, then it is important for our students to know also for their educational purposes. (Many of them are teachers in schools and other formal educational institutions, but all of them, we believe, have an educational role in society at large.)

The formal research enquiry which is briefly reported here was also an integral part of one of the compulsory subjects of the Centre. We were concerned in that subject with the rise and fall of environmental consciousness, particularly in the early 1970s and the late 1980s; and we were also concerned with what had informed and motivated our students in personal terms. It was, therefore, very much part of our teaching both to draw out from our students their own personal experiences and to demonstrate to them the role for action research of this type in an educational process. It is an enquiry into the way environmental ideas spread in society, yet it is also an enquiry into the nature of those ideas and what values they represent. Finally it is an enquiry into the way the educational process itself is influenced by and in turn influences environmental knowledge and values.

The Enquiry

The enquiry, entitled 'Landmarks in the Dawning of Environmental Awareness' consisted of a questionnaire given to all students of the Centre enrolled in the subject Environmental Politics, Philosophy and Ethics (at the time, 37 students) prior to a session in which the nature of and the reasons for the waxing and waning of environmental issues in politics, the media and popular consciousness was being examined. It was intended to stimulate thought, prompt considered responses and, through the results, provide a focus of debate for that and one or two subsequent sessions. The questionnaire (attached as an Appendix to this paper) was also part of a wider research study into the way environmental ideas spread and are interpreted in society. The questionnaire was subsequently distributed to a further 50 or so students in the Centre. It was, therefore, at one and the same time both a teaching device and a research instrument. The results of this survey are presented in this paper in both senses. Firstly, the findings on the backgrounds, the influences on, the ideologies of the students are presented in the belief that the students are typical of tertiary level Environmental Studies students and that what we have learnt will be valuable to others teaching in the area. This work is also
presented as an example of an investigation into the educational process itself.

In all, 91 questionnaires were distributed to 88 M.Env.St. or Grad.Dip.Env.St. students and 3 Ph.D students, and 41 were returned. No follow ups were carried out. The questionnaire did not ask for any details of education or employment, but the details for all those taken into the Centre in 1988/92 are shown in Table 1 to indicate the range of backgrounds of those responding.

Attention is drawn to the wide range of qualifications held by these students - several with Ph.Ds, a handful with sub-degree qualifications - and the enormous range of backgrounds from which they come. Music and Performing Arts is just about the only faculty at Adelaide University not currently represented among the students at the Centre, although it has been represented in the past.

Additional information in this paper comes from verbal comments made during the sessions of the course devoted to this material, written work produced in whole or in part as a response to or developed from these sessions, and comments provided by the students as part of a formal evaluation on the whole subject run by the Advisory Centre for University Education (ACUE) at Adelaide University.

Some Results and Interpretations
Of the students responding 19 were male and 21 were female. The age distribution was:

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<th>Age Group</th>
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The ages at which they first started becoming aware of environmental issues were:

- under 10: 1
- 11-19: 1
- 20-29: 121
- 30+: 1

The decade during which they first became aware of environmental issues was:

- pre-1960: 1960
- 1960-69: 2
- 1970-79: 1
- 1980-89: 2
- 1990s: 1
- over 1980: 3

We will not comment at length on these data at present. We would point out, though, the spread of ages of the students and the very young ages at which many of them became involved. There is little correlation between the ages of the students now and the age at which they became environmentally aware.

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<th>Age of First Awareness</th>
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This tentatively suggests that the two periods of major environmental
concern - the early 1970s and the late 1980s may be less significant, at least for these students, than is often believed.

We now turn to question 4 of the questionnaire - the dominant things which influenced the way the students currently think about environmental issues. Most of the responses named at least two such stimuli and, because of this and the smallness of the sample, we offer the following findings without any statistical comment.

The results nevertheless are of considerable interest. First, there appear what might be termed the predictable reasons why people became environmentalists, that is, specific environmental issues and campaigns:

- The Lake Pedder Campaign
- The Franklin Dam Campaign
- The Chernobyl Incident
- Bhopal
- The Save the Whales Campaign
- Cyclone Tracy
- Green Bans
- Nuclear War/Peace Issues

The impact of particular people and the books they have written and of films they have made are very important, with 10 responses nominating particular books or magazines (with several mentions for 'Mad' magazine curiously enough), 9 nominating media programs, and 2 naming particular films or videos (including Peter Watkins' The War Game). Seven people nominated family activities such as holidays and outings in Australia, 3 named teachers at school or university (although 6 nominated university study in general, and 2 nominated school study in general.)

If these were all the responses they would be conventional and unremarkable. We believe, however, that the most significant sets of results concern the influence which particular people have had, largely in nonformal educational situations and the role of the environment itself.

(i) The influence of particular people

A total of twenty responses (which included some of the immediately preceding) referred very specifically to a person or people and local activist groups by whom they had been very significantly influenced. In addition, 4 mentioned being associated with people who specifically did not care about the environment, something which persuaded students that they themselves should do something. The importance of personal contact begins to manifest itself.

Questions 19, 20 and 21 also asked about the influence of people, either in general or in particular. In question 19, close to 50 national and international 'environmental activists' were named, including Mikhail Gorbachev, Sting, Douglas Adams, Pope John Paul II, the Dalai Lama, 'the man who died on the Rainbow Warrior', Chico Mendes, Gro Harlem Brundtland, Carlo Ripo di Meana, and Carl Sagan, as eclectic a list as could be wished for! The leaders in the list were David Attenborough, although most
doubted he was really an activist, David Suzuki, Paul Ehrlich and Bob Brown. Peter Garrett, the President of the Australian Conservation Foundation, was also very commonly mentioned.

Nineteen people nominated an environmentally aware friend, 8 a high school teacher, 9 a university lecturer, 7 a work colleague, 4 fellow students and 6 local activists. Fourteen nominated members of their family including siblings, offspring, parents and grandparents.

But the importance of personal communication, personal support and individual influences comes as much from the written comments as from counting the numerical responses:

"... main influence in my life has been particular people ...

"... people and political involvement have been more important in shaping my ideas than theory or formal environmental education."

"I ... like hearing people talk; sharing their ideas and experiences."

"... influences have been ongoing through people I have met ...

"... association with Aboriginal people and their traditional culture which presents a completely different perspective and ethic on how people can relate to the natural world."

"... I feel the limitations of 'science' very strongly as being 'not enough'. ... feel the need for people to 'grow' in themselves, their relationships and community interactions. ... environmental awareness and social change will come from, or be concurrent with, a change in this 'inner' sense ...

(ii) The influence of the 'natural' environment
The second and perhaps most important conclusion is that personal experience of good or bad environments was of major significance. Being brought up in or experiencing beautiful surroundings and having a 'love of nature' influenced 13 or the respondents, whereas experiencing degraded environments, pollution or other adverse environmental experiences, were among the most important things for 15 of the students. These, coupled with the fact that several students had been actively involved in the Franklin Campaign and that three mentioned overseas travel, strongly suggest that education in the environment is one of the most important ways of educating for the environment. Again, the strength of this conclusion is reinforced by quoting some of the specific comments on the returned questionnaires:
"...most prominent has been first hand experience and interaction with environments ..."

"An appreciation for the nonhuman world, wilderness, etc. fostered by regular family trips to National Parks, etc...." 

Question 12 asked whether the respondent was an Environmental Studies student primarily because they felt deeply about the environment or because they believed the qualification would benefit them practically. Question 13 asked for a quantification of this expression of feeling. Only three saw the qualification as more important to them. Thirty one were more concerned personally with the environment than the qualification, and the remainder saw these two as of equal importance. (The numerical scores were 236 for concern for the environment versus 145 for the qualification.) However, twenty responses did mention to varying degrees the interconnectedness of the two, either expressing the need to integrate the personal and the professional, or mentioning the need to have the qualification in order to do something about the environment.

We suspect that this level of commitment to the subject matter of their academic study largely ignoring the formal qualification would be found in few other areas, with music, women's studies and peace studies being possible exceptions. Although this is not to deny that at the postgraduate level, at least, students are very likely to be very interested in their subject.

(iii) The holistic and unbounded nature of Environmental Studies

Question 18 asked students about books which had profoundly affected their environmental thinking and awareness. Rachel Carson's Silent Spring, James Lovelock's Gaia, The Ecologist's Blueprint for Survival, and the Brundtland Report, Our Common Future had been read by more than half the sample (and were nominated reading for constituent subjects in the course.) Apart from these, more than 50 other books were nominated as having had an influence on respondents. These predictably included books by philosophers such as Peter Singer and John Passmore, but much less predictably activists such as Rudolph Bahro, Edward Abbey and Vincent Serventy, feminists such as Germaine Greer and Carolyn Merchant, social theorists such as Pierre Bourdieu, Foucault and Carl Jung, novelists such as Umberto Eco, Ben Elton and Neville Shute, scientists such as Ben Selinger, Lynn Margulis and David Bohm, among others. Given that, among the students at the time were those with Ph.Ds in anthropology, in pharmacology and zoology, together with students with Honours and Ordinary degrees in a very wide range of other subjects, this is perhaps not surprising. It does pose problems, though, in finding a common discourse in which to conduct classes and other educational activities in constituent subjects of our awards - a seemingly trivial but not unimportant pedagogic point. How are we in Environmental Studies to establish our own ideology in the face of such difficulties?
For example, among the comments made on a formal Advisory Centre for University Education evaluation of one of the compulsory subjects of the course were:

"For students unused to the teaching of philosophy ... a lot of information given in lectures was lost through lack of understanding ... and new jargon"

"sometimes assumes that all students have reached a certain level of knowledge when in fact some students have no background".

We suggest that informal communication among the students themselves is the way it might happen. For example, for many students the best aspects of the course were:

"The wide range of issues introduced and the disparate backgrounds of the students ..."

"The feeling of intense cooperation among students ..."

"The views of others ..."

"People in the class very knowledgeable"

"Getting to know people from many backgrounds..."

and so on.

One of the obvious problems in environmental education is the extent to which reliance should and must be made on scientific understanding and explanation of environmental issues and the problems which this poses for the environmental education of those without a significant scientific background. It is true that, as Gough (1987) reminds us, it is a myth that "practical problems can be solved ... by 'applying scientific knowledge, methods and skills' (Victoria, Minister of Education 1984: 19). Practical problems ... necessarily involve subjectivity. Their resolution requires personal knowledge, critical skills and value judgements, not just the 'objective' methods of the sciences and technologies." (our emphasis) (Gough 1987: 57-59)

But the Victorian Minister of Education clearly believed that practical problems can be solved by applying scientific knowledge, methods and skills, as do probably a majority of scientists with environmental leanings. And the implication of the 'just' is that scientific methods are necessary, if not sufficient.

How then should we respond to students who tell us that
"... I feel the limitations of 'science' very strongly as being 'not enough'. ... feel the need for people to 'grow' in themselves, their relationships and community interactions. ... environmental awareness and social change will come from, or be concurrent with, a change in this 'inner' sense ..."

and that

"... my views on the environment come from spiritual, mystical, psychical interest rather than from deep knowledge of the environment as an issue"

when there are others who respond as follows:

"With an academic background in science and agriculture and an employment history in an environment related field I felt I had a good understanding of at least the environment. My political leaning was conservative yet open enough (in my view at the time) to accept a well-argued case from the other side. Philosophy and ethics were 'Arts' subjects, not worthy of real investigation, or so I saw it then.

"Along with many other more science-based students enroled in the subject 'Environmental Politics, Philosophy and Ethics', my aim was to alleviate environmental ills through putting things right by reduction of issues to logical, causal agents, resolve their influence, then improve the situation.

"Scientific method, logic and common sense were seen as the tools to tackle any environmental problem. Problems themselves were seen as physical and financial, with little immediate sociological and ethical relevance let alone any philosophical significance."

In fact, this latter student then led a tutorial investigation into the subject of vegetarianism and, good empiricist that he was,

"Not being convinced of the ethic of vegetarianism and being hungry for some real data, I took a more positivist approach - to obtain some hard data myself, through a student survey."

"The tutorial was presented with much gusto", he tells us, but then he asks "Could it have been a mistake to be so analytical?"

He continues:

"Somehow my perception of the world became richer for the revelation of the interplay of all factors. Emphasis on hard data before action was suddenly relegated below 'soft' or more vital life and holistic issues. People, creatures, plant life, ecosystems, the biospheric spaceship was (at last) seen to be paramount, whether or not it could be proven!

"Yes, I do hold certain spiritual views and have (prior to Environmental
Politics, Philosophy and Ethics) held definite, concrete, scientifically-based (factual) attitudes towards many issues - environmental and otherwise. However, these should not necessarily preclude open, lateral consideration of environmental issues on today's agenda. Neither should these beliefs and attitudes be irrevocably discounted.

This student's background and previously acquired values led him to approach this task the way he did. Paradoxically, it was doing it this way which reinforced the conclusion he came to. In other words, much of his previous experience had led him to a positivist outlook, which was nevertheless amenable to change when challenged.

One of the other general comments given on the questionnaires was that "... change takes place on a one to one basis..."

This example given is offered as one, but not the only, manifestation that such one to one change is indeed important.

The Relationship Between Educational Research and Learning Processes

We return to the two senses of the word 'trialogue' with which we began this paper. The questionnaire on which the paper is largely based was intended, amongst other things, to determine the range of values about the environment which students held and from where and whom they had obtained them. But the questionnaire was also part of our teaching strategy in that, firstly, it attempted to demonstrate to students that their preexisting values and ideas were important and came from a range of sources outside the formal educational system and, secondly, it facilitated the modification of the authors' teaching methods and strategies in the light of this knowledge. Clearly our own teaching strategies are far from 'atheoretical' if they rely to any significant extent on this empirical research. Furthermore, since the research itself is based on certain assumptions and values, we appear to be in an infinite regress. Infiltrated into this regress is the information on 'the environment itself' which is ostensibly the subject of all this environmental education.

The trialogue then resolves itself into one in which environmental researchers carry out their work with we hope concern for the environment underpinning it;

that what they then teach is based in part on these research findings, in part on their own values and in part on social expectation of them;
that students can express intentions concerning what they wish to learn in the light of their preexisting knowledge and values;

that educational researchers can help ensure that both of these occur and make more explicit the values of all concerned

References


Young, J. (1991) Sustaining the Earth, University of NSW Press, Sydney

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