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The role of ecology in education: an Australian perspective

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Introduction

This chapter will begin with a reflection on the field of environmental education in the last decade or so. It will be argued that the field has been dominated by a 'technocratic rationality' – a technocratic curriculum with an emphasis on the transmission (as propositional knowledge) of objectivist conceptions of 'ecology' and other scientific concepts that tend to limit our understanding of environmental issues; and that technocratic approaches to teacher education in environmental education (with an emphasis on top-down or center-periphery processes of professional development) tend to limit the opportunities for teachers to explore alternative forms of curriculum in environmental education.

Technocratic rationality in environmental education

One of the myths in environmental education is that its origins lie in the field of science education or the practice of nature study – that environmental education is in some sense a step-child of science education. The records of the UNESCO-UNEP International Programme in Environmental Education show that environmental education as we know it today originated jointly in the concerns of Third World countries about the extent to which their countries were being degraded environmentally by the activities of developed (overdeveloped?) countries, and in the concerns of fairly ad hoc community groups about the visibly deteriorating environment. These origins were essentially political in nature, involving the often competing vested interests of individuals, groups and nations.

Yet ironically, as the environmental education movement became established and began to express itself in school curricula, there was a marked tendency for environmental education to be co-opted by science

education, with the result that much of the former's political edge was lost. Environmental problems became interpreted as mainly technical problems susceptible to technical solutions of the kind that science is competent in supplying. Environmental education came to be dominated by the natural science approach (Schleicher, 1989). A heavy emphasis emerged on the formal provision of systematic knowledge drawn from the traditional science disciplines of geography, geology and biology (especially the treatment of basic ecological principles).

It seemed to be assumed that the acquisition by students of an ecological perspective and an appreciation of the ecosystem concept would forestall environmentally damaging actions on their part, and develop in them an informed concern for the environment.

The irony in this trend is that to the very extent that the problems and solutions came to be seen from a scientific perspective (that is, to the extent that environmental education came to be seen as an applied science), our rationality came to be of the *technocratic* kind. Technocratic rationality tends to be marked by a dominant and almost blind faith in the capacities and qualities of science (prime among these being claims about 'objectivity', 'rationality' and 'truth') to deal effectively and efficiently ('positively') with a range of problems that beset us. As this dominant technocratic rationality subsumed the fledgeling environmental education movement, there was a diminishment of the important capacity to see environmental problems as essentially political issues to do with contests between differing vested interests. In the author's view, failing to understand environmental problems in these terms in turn diminishes our capacities to deal effectively with them, and to provide an appropriate form of environmental education in schools. As early as 1977, an influential UNESCO publication recognised and described the danger of this 'technocratic rationality' in environmental education:

At any one time, the educational system – whether based on religious dogmas and practices or on rational thought – has tried to divulge, sustain, and perpetuate sets of social values. The process has occurred at some times openly, at other times through devious channels. If you consider the world today and examine the diverse educational systems, you can clearly identify competing ideologies; those which are attempting to hold on to recognised and almost undisputed values, and those which have launched a major strategy for conquering the world and men's minds.

In other terms, behind any educational process lies a philosophy, a moral philosophy, for the people who exert power and are in charge of educational institutions share certain values, which they wish to disseminate in order to ensure

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the prolongation, if not the indefinite survival, of the system they are devoted to.
(Buzzati-Traverso, 1977, p. 14)

One of the outcomes of a technocratic rationality in education in general is an emphasis on the didactic teaching of pre-ordinate knowledge – knowledge that is systematically selected and organised before the classroom activities through which it is ‘transmitted’ to students. In environmental education, notions like ‘the ecosystem concept’ and ‘basic ecological principles’ form a conspicuous part of this pre-ordinate knowledge. In this approach, ‘ecology’ is often treated as a means of perceiving the environment ‘as it is’, as it ‘really exists out there’ in a purportedly objective sense, in a way that is disjoined from personal, political and social values.

‘Ecological principles’ are perceived as the framework that we need in order to ‘see’ the environment as it really is – as if the environment is a fixed, concrete entity awaiting discovery by people equipped with the right tools. That is, technocratic rationality is expressed not only in the pedagogy of environmental education (transmission of propositional knowledge) but also in the objectivist images of ‘environment’ and ‘ecology’ that tend to be promulgated. This is in contrast with more subjectivist post-empiricist views (for example, in some recent formulations of ‘science–technology–society’ (STS) – see Aikenhead, 1988) in which ‘ecology’ may be seen as an essentially human figment, concerned with the development and application of a *socially constructed framework* in a process of *interpretation of an experienced environment*. In the words of Giovanna Di Chiro:

The environment is what surrounds us, materially and socially. We define it as such by use of our own individual and culturally imposed interpretive categories, and it exists as the environment at the moment we name it and imbue it with meaning. Therefore, the environment is not something that has a reality totally outside or separate from ourselves and our social milieu. Rather it should be understood as the conceptual interactions between our physical surroundings and the social, political and economic forces that organise us in the context of these surroundings. And if we view the environment as a social construct then we accept that certain qualities of it can be transformed according to whichever social relationships are in operation.

If we view the environment as a social construct, we can also view the ‘environmental problem’ very differently . . . Environmental problems are . . . social problems, caused by societal practices and structures, and only viewed or socially constructed as problems because of their effects on human individuals and groups (of course other living things and systems are also affected).
(Di Chiro, 1987, p. 25)

To the extent that environmental education programs are based on the development of an objectivist understanding of 'ecology' – as an independently existing, fixed and 'real' framework – there is a developed blindness to the fundamentally political character of environmental problems. Put simply, if environmental problems are described only in the scientific terms of objective relationships between physically existing components, then important factors like vested human and state-related interests are overlooked:

The social component is all the more important because man tries to adjust nature in his interest and changes the environment according to value preferences, and because no lasting 'meaning' can be attributed to nature.
(Schleicher, 1989, p. 62)

Awareness of environmental problems is social awareness rather than ecological awareness. Such problems will be solved through collective action aimed at eradicating the social and economic causes of the degradation of the human environment. The political aspects of this search for solutions may give rise to conflicts of various kinds. One such conflict, and not the least, is the collision between the educational system and the private interests which operate in alliance with the powers of the State.
(Vidart, 1989)

Another outcome of technocratic rationality in environmental education is a belief in the authority of scientific knowledge, which expresses itself in various divisions of labour: for example, divisions between those who would produce knowledge (this tends to be the scientific academy) and those who ought to use or implement knowledge (practitioners of various kinds). In education, a technocratic rationality supports the division of *theorising, research and development* on the one hand (this being seen as the proper domain of the 'academy'), and *teaching practice* as technical implementation on the other (this being seen as the proper domain of schools). This division of labour is clearly seen in the 'research, development, diffusion, adoption' (RDDA) model of professional development and curriculum development in environmental education (Robottom, 1987a).

These two outcomes tend to interact. The technocratic interest that justifies and preserves a division of labour between the science (or science education) academy and teachers creates the conditions for the academy to enact a role of legitimating pre-ordinate, objectivist ecological knowledge as proper curriculum content. This can be seen in the move to a National Curriculum in the United Kingdom and, more recently, in Australia. However, as we shall see, there are recent developments that

challenge the dominant technocratic rationality in environmental education.

Recent international environmental education-related developments

(i) 'Science–technology–society'

There is increasing worldwide interest (see for example: Aikenhead, 1988; Iozzi, 1987; McFadden *et al.*, 1989) in a relatively new educational initiative, 'Science–technology–society' (STS). This approach has come to mean a way of teaching scientific content and skills in a meaningful context of technology and society. Teaching about relationships between science, technology and society is a relatively recent departure from former approaches in which science education in schools was seen in the vocational sense of preparation of students for technological competence in the society of the day.

Some narrow interpretations of STS have simply sought to teach those aspects of conventional science content that seem to have some application in alleviating certain pressing social problems. These interpretations suggest a one-way, instrumental relationship between science and society (science 'contributes' solutions to society), and tend to reinforce the traditional mainstay of science – its claim to objectivity, rationality and truth. But perhaps the real potential in STS is to teach science in a way that challenges rather than reinforces that traditional mainstay – to create the conditions for students to understand the social structure of science itself (Kuhn, 1962). There is the opportunity for activities that demonstrate how science (its research topics; what counts as appropriate research questions; what counts as acceptable methodologies and outcomes) is as much influenced by the society of the day as science itself shapes society by the creation of knowledge and the provision of solutions to problems. The STS initiative supplies opportunities for the truth claims of science to be presented as requiring appraisal in terms of their historical and cultural context.

The relevance for environmental education of these STS developments is that they offer a new way of perceiving science and its relationship with society – a way that allows us to shed some of the shackles of technocratic rationality. If science is perceived as socially constructed, then its special claims about the objectivity, rationality and truth of its knowledge (and the scientific processes that yield that knowledge) can be challenged. This may be a pre-requisite condition for recognising that the concepts of

‘ecology’ and ‘environment’, themselves part of the language of the traditional science discipline, are also social constructions and perhaps can be taught in environmental education in other than didactic, propositional fashion (see also Schleicher, 1989).

(ii) Practitioner research in environmental education

Kathleen Kelley of the Centre for Educational Research and Development at the Organisation for Economic Co-operation and Development (OECD) in Paris coordinates a current major OECD-funded project in Western Europe, the ‘Environment and School Initiatives’ project (see Posch, 1990). This project has two important dimensions: a substantive environmental education emphasis on participatory, action-based environmental enquiries; and a ‘procedural’, professional development emphasis on systematic reflection on action by participating teachers (action research). What is distinctive about this project is that it argues for and enacts a higher professional role for practitioners – rather than confining teachers to the role of technical implementers of the curricula designed by others (as is the case in the RDDA approach), the project encourages teachers to participate in research of their own, conducted in their own classrooms, and addressing environmental education issues of interest and concern to themselves.

Robottom and Muhlebach (1989), Greenall Gough and Robottom (1993), and Robottom (1990) describe a project in Australia in which students and teachers in seven isolated coastal schools participated in three overlapping activities: (i) enquiries into controversial issues concerning the quality of local freshwater and marine environments; (ii) participation in an international computer conference on the subject of water quality; and (iii) engagement in participatory educational research into the pedagogical and curriculum issues that arise as attempts are made to demonstrate the first two dimensions of the project, in a similar fashion to the action research conducted by the teachers in Kelley’s study. One of the understandings emerging from this project is that, in environmental education, there may be a surprisingly minor role for taught ecological principles in contrast with opportunities for engaging social and political influences. Another understanding is the importance of the ‘working knowledge’ that emerges from the critical, community-based enquiries of students as they investigate local, controversial environmental issues. Action-based, community-embedded forms of enquiry yield knowledge that is transactional rather than transmissional, generative/emergent

rather than pre-ordinate, opportunistic rather than systematic, and idiosyncratic rather than generalisable. This emergent working knowledge needs to be recognised as proper curriculum ‘content’ with at least equal status to pre-ordinate, systematic ecological principles. The Australian project demonstrates that this ‘working knowledge’ may take several forms – for example: computer conference dialogue in which students at the same or different schools articulate methodological problems as well as outcomes of environmental investigations; newspaper cuttings describing the influence in the community of the environmental enquiries conducted by students and teachers; and students’ and teachers’ contributions to workshops and conferences.

Emerging from these and other international perspectives on environmental education (see also Hale, 1990; Hart, 1990) is a recurring concern that in environmental education we need to enact alternatives to the dominant technocratic rationality of traditional approaches to curriculum development and professional development. Two ways in which these alternatives may be expressed are:

*Redefining curriculum content: recognising that in addition to the pre-ordinate, systematically organised and presented propositional knowledge (such as ‘basic ecological principles’) drawn from the traditional fields of knowledge (such as biology), there is value in the propositional ‘working knowledge’ that emerges from the socially critical enquiries of students and teachers as they conduct authentic research into local, controversial environmental issues in their communities. Of course, because such knowledge is community-based, it is idiosyncratic and does not fit well with notions of universal, generalisable curriculum content (Greenall Gough and Robottom, 1993).

*Role of the academy: recognising that the academy (researchers and teacher educators at colleges and universities; upper and medium level consultants in departments of education) may need to redefine their role. Their role may need to change from one of agency in the technocratic (RDDA) model of professional and curriculum development in which the problem of educational change is perceived as one requiring transmission of centrally determined ‘solutions’ in the form of curriculum materials to the ‘periphery’ (teachers in schools), to a role of creating the supporting conditions for teachers and others in their respective communities to carry out their own critical reflective enquiries into *their* theories, practices and educational predicaments, and the relationships between these (see Posch, 1990; Robottom, 1987b).

Conclusion

Politicised expressions of environmental education are hampered by the co-optation of the field by the technocratic rationality of empirical/analytic science. This is especially evident in the heavy dependence in environmental education curricula on the systematic treatment of 'basic ecological principles' as a key body of knowledge, and in professional and curriculum development in environmental education. Recent international developments in the field suggest that the relationship of some of the mainstays of curriculum (for example: the notion of universal, pre-ordinate curriculum content on ecology; the RDDA approach to educational change) with environmental education are in need of review.

Note

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Ecology and environmental education in schools in Britain

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Introduction

The past decade has seen a marked increase in public awareness of the natural world, mainly due to increased attention given by the media to natural history and related topics. Threats to the environment are becoming more visible as a consequence of this focus by the media.

The successful management of the environment in the future depends on the actions of government, industry, society and individuals. Sustainable, environmentally sound development will become a reality only if public awareness is coupled with the appropriate knowledge and skills and positive attitudes towards the environment.

Education has a key role to play in achieving a sustainable economy and society. This was emphasised by the Brundtland Commission in its report *Our Common Future* (World Commission on Environment and Development, 1987) in calling for a 'vast campaign of education, debate and public participation' to 'start now if sustainable human progress is to be achieved'. Present and future generations of school children are entitled to and must have access to a curriculum that addresses such matters.

Environmental education covers a broad spectrum and courses have been designed in the past whereby students receive their education, through, about, in and for the environment.

Ecological education has a narrower focus than environmental education and has been present in the curriculum of UK schools for some time. Its study was usually restricted to those following examination courses in biology or to those who were being taught by teachers with a particular interest in the environment. The Education Reform Act (1988), affecting state schools in England and Wales, ensures that all pupils of compulsory school age (5 to 16 years) will follow a balanced curriculum, and certain