Feature Article

Energy Education for the Environment

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Abstract

Learning about the utilization, development and perhaps conservation of energy for our expanding world population has long been a part of science curricula. The world "about" is, however, paramount in describing the nature of these courses, and parallels a similar phenomenon observed in numerous so-called environmental education programmes in schools. Despite the close association between energy use expansion and environmental impact, little "energy education for the environment" has occurred in this country.

This paper examines some of the reasons for this situation, and highlights the difficulties facing the environmental education teacher who wishes to lead a valid study of energy sources. External community influences, a lack of breath and problems with information availability are identified as factors which contribute to the present status of energy education. It is perhaps fortunate that the majority of students seem to possess positive attitudes towards energy conservation and the environment, and so, hopefully, remain receptive towards improvements in this aspect of environmental education.

Introduction

Environmental education has been defined by numerous theorists as "education for the environment" in which learners are encouraged to develop a rational autonomous concern for the environment. Emphasis is placed on the development of procedural skills including problem solving and decision making (Hall, 1977) so that the student develops a predisposition for active participation in environmental issues (Henry, 1984). The majority of environmental education programmes appearing in schools have however fallen considerably short of the aims described in the literature, for as described by Lucas (1980), Greenall (1981) and Walsh (1984) most programmes have tended to avoid the more difficult requirements of the e.e. definition and effectively become little more than field studies "in" and "about" the environment.

In the case of studying energy options and environmental effects the situation is even worse, for the topic constitutes only a subset (albeit an important one) of a possible environmental education course. "Energy sources" is often a topic (or an option!) in secondary science syllabuses but integrated into the main-stream curriculum its links with "education for the environment" are rarely emphasised. Nevertheless, energy resource oriented debate has been prominent in the media in recent years, both in terms of the global situation (such as the effects of the Arab oil embargo of the seventies) and in terms of more local issues (such as power station options). There is a need for environmental educationists to be aware of the scope, and possible pitfalls in teaching energy resource related topics, and address themselves to the question "How may we make energy education environmental?"

Difficulties in implementing e.e.e.

Successful implementation of "energy education for the environment" (e.e.e.) is fraught with numerous difficulties which parallel those of the internationally accepted version of environmental education. These difficulties include the effect of external social pressures and preconceived attitudes which result when dealing with sensitive issues, the problems of actually teaching the topic in an appropriate non-authoritative manner and, in some cases, the difficulty of obtaining accurate factual information to provide the knowledge base for informed decision making.

Attitudes

The first two points are certainly familiar topics in discussions of the implementation of environmental education. In matters related to development and utilization of energy sources the aims of an environmental education programme invariably lead to discussion of issues which are both controversial and topical. In a scenario of conflict between conservationists, government and developers, environmental education must draw on a range of disciplines, including economics and political science, whilst avoiding authoritative or indoctrinative strategies. Henry (1984) suggests the adoption of a facilitative role by the teacher but admits that if a teacher's accustomed style is a traditional knowledge based approach then that teacher's habitual teaching behaviour may well inhibit the succes-

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sful attainment of the goals of environmental education. A further, and perhaps not altogether desirable result, may be that in competition with persuasive influences outside the classroom the teacher's role is reduced so that a student may acquire entrenched negative attitudes on which the school course has little effect.

The need for the development of interesting and stimulating environmental education courses is clear. As Greenall (1985) and McNair Anderson (1982) point out

> "...Australians only think about Nature Conservation when a specific issue arises. Once that issue fades away, so does awareness and interest".

Similarly, it is only when a confrontation situation develops, such as occurred in South West Tasmania, that members of the public become aware of the direct relationship between energy resource development and environment.

Course Styles

A major problem has been a lack of breadth in courses purporting to be environmental education programmes. The required multi-disciplinary basis has not been developed and the majority of environmental education programmes are predominantly science based. That these courses have some value is not disputed but the infusion of environmental education within existing subject disciplines cannot claim to have been a success (Walsh, 1984). The preponderance of these knowledge based courses is largely based on the widespread assumption that giving information about an issue affecting the community should result in a more enlighted attitude, and hopefully result in improved enviromentally responsible behaviour. The relationship between attitude and knowledge is, however, often not a straightforward positive correlation (Maddock, 1978; Maddock and McDonald, 1982), and indeed poorly executed teaching procedures may result in the students acquiring certain negative attitudes (Young, 1980).

A common approach to the teaching of energy conservation and energy sources involves an excursion to an energy information centre, or a short term programme of detailed "energy awareness" through the use of an energy audit technique (eg Education Department of Tasmania, 1983). Although these approaches may have a short term beneficial effect in terms of an indirect energy education for the environment, their longer term performance is debatable. External influences soon exert their effect, and it is only by a pervasive environmental consciousness throughout the curriculum that the programme aims will be achieved. The effect of the covert curriculum cannot be over-estimated in this regard, and it is particularly important that schools do operate on environmentally sound energy conserving principles as outlined by the Australian Association for Environmental Education (1985).

The Case for Renewable Energy Sources

Procedural knowledge gained by students in any e.e.e. programme must incorporate an understanding of the potential role of renewable energy resources (solar, wind and hydro in particular) in contributing to the provision of energy at the various levels of need (local or domestic, state national and so on). This topic has not been successfully addressed to date, and yet it is certainly one which challenges the teacher of environmental education to bring a fully multi-disciplinary approach to bear on a realistic and relevant environmental issue.

The controversial nature of the topic demands a wide ranging basis for discussion, including environmental impact, politics and economics. Economics in particular must involve discussion of such factors as the cost of the delivered energy, the cost of construction, the number of people employed before and after construction, the possibility of modular expansion of the system, and so on. The challenge for the teacher is signifficant, for not only must the teaching methodology be valid, but the teacher is expected to be up to date with the latest information affecting the issue. It is here that the third difficulty in implementing e.e.e. becomes apparent, for the available knowledge basie is not always clear cut.

The Information Barrier

An example serves to illustrate the point. As part of an assesment of the energy alternatives available for Tasmania the Hydro Electric Commission (HEC) of that state undertook an assessment of the viability of wind energy. Included in the analysis were a number of assumptions, including the need for a bridge over Macquarie Harbour in the far South West of the state, and the use of large (2MW) prototype wind generators. The estimated cost of delivered power was 8.7¢/kWh (Hydro Electric Commission, 1979). A subsequent analysis by the University of NSW, with different assumptions (including the siting of the wind generators in settled areas of Tasmania), obtained a projected cost of 2.5¢/kWh (Blakers, 1985).

As the majority of teachers are not trained to adequately present the various renewable energy options in a cohesive, up to date manner a facilitative role is perhaps most appropriate. "Facts" such as the above certainly provide a basis for initiating discussion!

It is apparent, however, that the enormous inertia behind established ways of utilizing energy resources does place the environmental education teacher in a difficult position. The "energy crisis" is regarded by many people as merely an interesting historical feature of the seventies which is now over, and government funding of renewable energy research is correspondingly low. The environmental education teacher who wishes to teach energy education for the environment must avoid didactic teaching and encourage the students to develop rational, independent and concerned opinions in the face of considerable external pressures.

The question must then be asked: "Are we expecting too much of environmental education teachers?" Perhaps we are, and it is debatable whether the present teacher training facilities are geared even now to address the scope of environmental education defined at the Tbilisi conference (UNESCO, 1977). Nevertheless as Walsh (1984) points out, even if the introduction of an "environmental studies" subject into the curriculum only results in education about the environment this is still better than no emphasis at all.

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Outside the Secondary School

If energy education is to have any positive influence on the way in which energy resources are obtained from the environment, however, it is necessary for the message to reach a wider audience than students enrolled in a secondary school environmental studies course. Often educators fail to account for the significant number of learners not entrenched in the secondary/tertiary mainstream. In trade training alone (which is but a subset of Technical and Further Education) there are almost as many students as in universities or colleges of advanced education (Linke, 1984). Some of these students are exposed to courses in solar energy utilization, but, as an example of the limited extent of such courses, Reid (1986) found that "83% of plumbers interviewed had insufficient knowledge to service a solar hot water enquiry".

Fortunately, a number of organisations are now indirectly promoting e.e.e. through external programmes. The Glass Mass and Insulation Council of Australia has a programme directed at home builders which promotes, energy conservation through passive solar energy efficient houses. The philosophy behind the programme has been described by Hughes and Ballinger (1984) in the following terms:

> "education and promotion has been viewed as less obstructive than legislation, and improving design and construction standards as more cost effective and environmentally satisfactory.... than proving greater energy generating capacity".

Thus there is some move towards altering pre-conceived public attitudes, but the bulk of the responsibility for providing e.e.e. still presently rests with the practising environmental education teacher.

Student Attitudes and Knowledge

What successes, then, have been obtained by environmental education in the energy area? It would seem that the answer must be "few". Curriculum materials which emphasize the subtle relationships between energy and environment are rare, and the methodology for teaching this component of environmental education is still very much at the factual dissemination stage. This could mean a very gloomy prospect for the future, but fortunately research indicates that while student knowledge of energy-related issues is low, attitudes towards environment and energy conservation are generally positive.

Davis (1985a) undertook a preliminary assessment of student attitudes to energy conservation, lobby groups and environmental effects, and evaluated the same students' knowledge of sources of domestic energy usage and various methods of energy conservation. The results for the initial sample of 231 Tasmanian secondary school students showed that misconceptions on energy usage and costs were very prevalent with the mean score on the knowledge section of the test instrument being just 49%. Attitudes were assessed with multi-choice behaviour-orientated questions in which a response of "1" represented an energy conscious positive attitude, "3" represented a negative attitude and "2" represented the intermediate position. The mean response on the attitude section was 1.77 so as with Eyer's (1978) work on environmental attitudes it seems "They don't know much but their hearts are in the right place".

Similar results have been found with studies of attitudes to energy conservation in both Victoria (Prosser et al., 1984) and Queensland (Davis, 1985b).

Conclusion

The future of civilization depends, in large part, on the sensible development of energy resources in harmony with the environment. Irrespective of the environmental ethic one adopts it is clear that if 'living resources conservation for sustainable development' (Greenall, 1985) is to occur, then the nurturing of positive attitudes towards energy conservation within our students, and the community at large, is an essential prerequisite.

"Energy education for the environment" is still at an embryonic stage, and until all the aims of environmental education are implemented in schools there will be room for improvement. The problems have, however, been identified, and the challenge is there for all educators to develop new environmentally aware approaches in energy education.

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