

Consumers' Association of Penang

SEMINAR ON EDUCATION AND DEVELOPMENT

18 - 22 NOVEMBER 1983

PENANG, MALAYSIA

THE NEED FOR AN APPROPRIATE ENVIRONMENTAL EDUCATION

by

DR CHEONG SIEW YOONG
HEAD, DEPARTMENT OF MATHEMATICS
AND SCIENCE EDUCATION
FACULTY OF EDUCATION
UNIVERSITY MALAYA, KUALA LUMPUR

Copyright: CAP and AUTHOR

Consumers' Association of Penang
87 Cantonment Road
Penang
MALAYSIA



Abstract

Since the formulation of the National Environmental Policy and the establishment of The Ministry of Science, Technology and Environment in the mid 1970s, there has been an upsurge of interest in the environment and environmental problems. The question is whether the formal education system has responded well to this emerging concern.

It is recognised that a great deal of environmental learning takes place outside the formal education process and the best locations and opportunities for environmental education are found in the community. The focus of this paper is to evaluate the state of environmental education in the school system and to identify areas of curriculum needs which can help us develop a more meaningful environmental education programme.

The existing curriculum activities for environmental education for primary and secondary levels are briefly reviewed and some observations are made regarding the implementation of environmental education by teachers. The infusion of elements of environmental education into the different disciplines particularly into the science subjects can be described as incidental.

The findings of three research studies are elaborated to provide some objective evidence about student learnings about environment as well as perceptions of science teachers about the social relevance of the science curricula. Based on these findings some constraints to the development of environmental education are inferred.

Five curriculum issues representing the areas of need for environmental education in school are selected for discussion and these include: nature of environmental education, selection of content, curriculum design strategies, teaching-learning methodologies and evaluation. The discussion highlights the need to have a clear conceptualisation of the nature and goals of environmental education and their

implications for the process of developing environmental education. It includes: what it is, how do we select the content for it, how do we organise the content, what are the appropriate teaching methodologies and how do we assess its learnings.

Teacher preparation is the key to effecting environmental education in the schools. The shortcomings of the present teacher training curriculum are described briefly. Future changes to the teacher training are implied through a discussion of the specific roles of teachers in environmental education.

The inadequacies of the existing school system for environmental education are identified, and, although the problems are mainly curricular and institutional, development of environmental education can be enhanced by the inputs of environmentalists and other professionals. A national policy is needed to provide the motivation and direction in development efforts. Action-oriented research and experimentation would also be needed to provide the necessary base-line data particularly with regard to innovative teaching techniques and the evaluation of learning.

The Need for an Appropriate Environmental Education

Cheong Siew Yoong

1. Introduction

Educationists, by and large, react slowly to social concerns and needs and this has certainly been the case with the introduction of environmental education into the schools. Over the past decade or so, few other issues have received more public attention and had more media coverage than problems of the environment, such as pollution, deforestation, flash floods etc., which have been brought about by resource development, by industrialization, by urban growth and particularly by the poor attitudes of people towards safe-guarding environmental quality. In 1975 a new Ministry, the Ministry of Science, Technology and Environment was set up and within it the Department of Environment was established to deal with environmental matters and these include the assessment of the impact of human and industrial activities and the enforcement of legislations provided for by the Environmental Quality Act 1974. The government had also formulated the national environmental policy in its Third Malaysia Plan (1976-1980)¹ which is aimed at ensuring that development will be in balance with the conservation of environmental quality.

Complementing the official position of Government are the efforts of private organisations concerned with the protection and preservation of the environment. Notable among these are: the Consumers Association of Penang which takes up issues that have wide public interest; the Environmental Protection Society of Malaysia which, among other things, has as its main interest the creation of awareness about the collapsing ecological system and human environment; the Malayan Nature Society whose objectives relate to the conservation of nature; Friends of the Earth Malaysia which focuses on the growing environmental crises and the Malaysian Scientific Association which is particularly concerned with the impact of science and technology on society.

All these are indicative of the importance that Malaysia places on good environmental management and control as a necessary condition to national development and to improving the quality of life. The question to ask is whether the formal education process has responded well to this emerging concern about the environment. Is environmental education in our educational institutions appropriate to the national aspiration for a clean and healthful environment and at the same time supportive of the educational needs of our children?

Before I take up the issues involved, I would like to remind ourselves that formal institutions of learning or training are not the only places in which environmental education occurs. This is true because in environmental education we are dealing with issues directly relevant to life and society, and consequently, the community has some of the best opportunities and locations for environmental education. They may be, for example, the mass media, zoos, museums, factories, plantations, health centres, trade exhibitions, shopping complexes or the home. The point that I wish to make is that not all environmental education can, or should, be done in schools, colleges, universities or training institutes and that much learnings about environmental matters do take place outside these precincts. The formal education process should therefore harness these learnings to enhance and reinforce what it has to offer.

Let me at this juncture specify the limitations and scope of this paper. Firstly, my field is science education and my area of specialisation is curriculum development and instruction. I have very little experience with other subjects and thus my comments are made within these restrictions. Secondly, I shall not attempt to justify 'the need for an appropriate environmental education' as the title suggests for the simple reason that environmental education for children has been universally accepted and going on in this country. Instead, I shall focus on 'the needs of' or in other words what the needs are if we desire to provide an appropriate environmental education in school. These areas of needs can be used as the basis for examining the adequacy of existing provisions for environmental education in the schools. Thirdly, I shall confine myself to curriculum issues in environmental education in the formal teaching process only and shall not include the contributions of out-of-school experiences or school club projects which, as I have implied earlier, have significant inputs towards achieving the objectives of environmental education. Lastly, I will concentrate my attention on primary and secondary school levels only because that is where I feel the pressures on curriculum are most acute.

2. Overview of Curriculum in Environmental Education

The present state of environmental education in school is difficult to describe in any comprehensive way for it involves a multitude of aims and activities spread throughout the school curriculum. Within the school curriculum, we do not have a distinct subject in environmental education. Neither has there been explicit intentions to include environment education elements into the school subjects when syllabuses in science and social science fields were

revised in the late 60s and 70s. However, as part of curriculum reform, all new courses have been developed to incorporate up-to-date subject matter content, new teaching methods, and some contemporary problems related to societal conditions and pupil needs. And it is to that extent that we find environmental relevance in the teaching materials used in schools.

2.1 Activity at Primary Level

Children at the primary level have the same teacher for almost all their subjects and it should be relatively easy for teachers, theoretically speaking, to use a flexible approach in teaching about environmental problems. If the curriculum guides for the various subjects are any measure of actual emphasis given to the environment, it does appear that all children will have an introductory exposure to environmental education. The main stress of primary education is to develop in children the basic skills in language, mathematics and communication as well as an understanding of their immediate environments. In science, for instance, the curriculum is focused on elementary concepts of the living and non-living components of the environment, of the adaptations of plants and animals to the environment, and of the interrelationships between aspects of the environment and the child himself. The fundamental rationale of primary education is to have children explore into the nature of things based on their curiosity and interest. Teachers are thus encouraged to involve children in concrete activities as much as possible based on the principles of inquiry learning and scientific investigation.

2.2 Activities at Secondary Level

The secondary school curriculum is structured along disciplined lines and it is through these subject disciplines that environmental education course. During the last fifteen years there has been a number of changes in the traditional courses and these changes have led to an orientation towards environmental studies. For a small range of topics, elements of environmental education have been infused into the subject matter, for others the study of environmental issues occurs only by incidental influence, mainly through the initiatives of teachers to bring up issues for study. In the latter situation or in cases where the subjects are theoretical in emphasis there is no guarantee that students will have much opportunity to discuss environmental matters.

The science curricula, which have been modernised in recent years namely, Integrated Science for Forms 1 - 3, Modern Biology, Modern Chemistry, Modern Physics and Modern General Science for Forms 4 - 5,

have as part of its overall philosophy the promotion of learning about the application of scientific information, mainly in technology, and about the social implications of science for everyday living. For instance, one of the aims of the Modern Biology course is to help pupils:

... become responsible members of the community, ready to adapt to a changing environment and to technological developments. In particular: (a) to give an understanding of human biology and the relationship of man to his environment; (b) to stimulate an awareness of the contribution of biology to the economics and social aspects of community life.²

The desire to make science education relevant is also reflected in the Malaysian General Science Course implemented in schools since 1978. Designed for all Arts students:

... it is a functional science course that serves the need of the common man. ... the emphasis ... is upon the application of science to everyday living - to agriculture, industry, medicine, food and health. It stresses the importance of the understanding of the role of science in society, as well as on developing a scientific way of thinking.³

In line with this rationale, some issues of environment have been included in the curriculum materials of the secondary science programmes, for example, depletion of natural resources, air and water pollution, threats to nitrogen cycle, the energy crises, health, and population growth. However, the main objective of science education remains the presentation of science as a system of conceptual knowledge, of scientific processes and attitudes, and as a way of inquiry involving objective investigation. Accordingly, content-based learning and laboratory experiments form the dominant features in science teaching at the upper secondary level. This practice appears to be appropriate to meeting the demands of the education system which places priority on passing examinations, particularly the SRP and SPM examinations, which at this time seem to evaluate more the cognitive rather than affective learnings.

What effect has current curricular emphases on the implementation of environmental education by teachers in schools? In the first place, we should recognise that the penetration of an environmental philosophy or of some environmental issues into the school curriculum does not guarantee that the aims of environmental education, in its best traditions, will be achieved. In the second place, teachers ought to be clear about the type of contributions school subjects are expected to make towards

environmental education and, when given the option to choose alternate teaching materials or strategies, must be prepared to deviate from given curriculum specifications. If I may be allowed to make my observations here, it seems to me that, hitherto, the emphasis given to environmental issues in school is rather diffuse and mostly superficial. It is, by and large, dependent on the interpretations individual teachers make of its importance in the context of teaching subject matter content and of meeting examination demands. It is thus very much restricted to what teachers interested in environmental issues want to and can teach. As such it becomes a function of the willingness of teachers to spend time on the wider application of knowledge as it relates to concerns and events occurring in society. Moreover, it is also limited by the teachers' knowledge about environmental problems, by their abilities to handle the teaching of problems and, to some extent, their biases, or even naivety, about policies and actions addressed to the improvement of environmental conditions. In short, environmental education in school is represented by how teachers choose to approach the teaching of their subjects relative to environment, and consequently the emphasis given to environment varies widely in intent, scope, directions and impact.

We can in fact place a lot of things going on in schools under the rubric of environmental education. For instance, biology is environmental when we study the web of life in the local pond. Chemistry gets environmental relevance when acid-rain is analysed for its constituent content. Physics has social concern when we study how fast fossil fuel is being consumed. History deals with changes we wrought to the environment when we examine how urban cities develop over time, and geography is pollution-oriented when we see how land is being used for housing development. We hope good values are inculcated and practised in moral education and even Art classes becomes environmental when a haze is painted over the skyline of Kuala Lumpur. These are all valuable activities, yet, is this the kind of environmental education we want from schools? How do such types of activities fit into the total framework of education, and are they sufficient to prepare students to be responsible and competent members of society, able to contribute to the improvement of the environment and hence quality of life?

3. Some Evaluation Studies

A number of research albeit small studies have recently been completed or are being undertaken by lecturers and higher degrees students at the Faculty of Education, University of Malaya and these

are providing some objective insights into the state of environmental learning in the schools.

In 1980 a sample survey was done to gather information about the level of understanding of the environment of ^{science} students in Form 4 and to assess their attitudes towards certain environmental problems. In this study it was found that:

1. on the whole the students had a poor grasp of specific knowledge of environmental problems, events or conditions,
2. students had positive attitudes towards the environment. This attitude, however, did not have a strong correlation with factual knowledge of environment,
3. student attitudes were positive when the objects or events of concern were fairly removed from them but attitudes were rather negative or strongly positive when the objects or events had a direct influence on their lives, and
4. most indicated that the mass media were their major sources of environmental knowledge. 55% of the students gained most of their information from private reading, radio and T.V. Only about 38% said they obtained their knowledge from their education at school and 7% through talking with parents, friends and other people.

Two pieces of information uncovered in this exploratory study should be of interest to us: firstly, the general inadequate knowledge, general and scientific, about problems and issues related to environment, and secondly, the attitudes, though positive, which have been developed without the benefit of sound environmental knowledge. Attitudes without the benefit of a strong base of cognitive information can be just 'learned responses' and, if so, cannot be considered firm beliefs which will be translated into responsible social behaviour.

Another study was carried out in 1982 to investigate the relevance of the teaching of ecology to environmental awareness among students in Forms 4 and 5.⁵ Some of the findings include the following

1. Students were slightly to moderately aware of environmental problems.
2. The teaching of ecology in secondary level biology and general science did not enhance environmental awareness in students.
3. Students showed concern for environmental problems that were real to them and existed in their own surroundings. To problems they were not fully aware of, they were neither positively nor negatively concerned.

4. As to the question of what they could do to alleviate environmental problems most students felt that they were in no position to do anything concrete themselves though they were positive that something could probably be done, especially for problems like overfishing, indiscriminate logging, oil spills, depletion of natural habitats and noise pollution. Their opinion was that whatever small role they could play it would be insignificant compared to the intensity of the problems existing in the society.

The third study being completed at this time is to seek the opinions and perceptions of science teachers about the social relevance of the four science curricula used in secondary schools.⁶ Over 70 teachers had responded to a questionnaire and were interviewed to ascertain (a) the extent to which the curricula provide for study of social issues, (b) how teachers teach, and (c) what might be done to increase the social relevance of school science. Some preliminary findings from this study are as follows:

1. Science teachers are of the opinion that on the average about 70-80% of the science curricular materials are concerned with theoretical concepts and principles.
2. To the question whether attempts made to link theory with applications of science to areas of human needs are adequate, only about 20% of the teachers thought they are, and over 75% of them indicated that the emphasis can be increased.
3. Over 80% of them feel that the science curricula do allow them to refer freely the science they teach to areas of human concern in their teaching. While about 50% of the biology and general science teachers said they frequently do so, over 50% of physics and chemistry teachers only occasionally bring up issues in their lessons.
4. About 75% of teachers indicate that they seldom or only occasionally make a special effort to keep abreast with problems of society so that they are better equipped with recent examples and events to relate science to areas of human needs.
5. Models and charts are the most frequently used aids in teaching. About 75% of teachers indicate that they seldom or occasionally use articles from other books/magazines as resources to help them teach issues;

over 90% of the teachers did not use outside resource personnel and over 80% did not use field study/excursions in teaching. About 85% seldom or hardly use sound films, slides or television. The main reasons given by teachers for the minimal use of resources include lack of time, overloaded syllabuses and lack of facilities in the school.

Summarising the discussions made so far, it can be concluded that over the last few years the environmental awareness of students has improved and a trend is evident for environmental matters to be brought up in teaching. However, the development of environmental education in school is constrained by a variety of factors, among which are:

1. imperfect curriculum design and content,
2. organisation of subject matter according to traditional disciplines,
3. theoretical and non 'problem-solving' nature of education,
4. the system of evaluation which focuses too much on cognitive outcomes,
5. insufficient preparation of teachers and
6. underutilisation of resources such as extracurricular materials, people in the community and out-of-school opportunities.

4. Some Curriculum Issues

Having stated what is happening, and the problems facing us, I would like to discuss some curriculum issues which could help us develop a more meaningful environmental education for schools.

4.1 Nature of Environmental Education

As with all educational endeavours, our first need is one of recognition of purpose. Much has already been written about goals of environmental education and a variety of proposals exist in the literature concerning what environmental education is. For instance, Unesco's Medium-Term Plan (1984-1989) states that environmental education has:

... the twofold aim of fostering a more precise understanding of the problems (of environment) and of arousing a desire for active participation in measures to solve them. Such education cannot be purely cognitive: it should also develop appreciation of and respect for the environment, together with a sense of responsibility and a concern to contribute, through the adoption of

suitable behaviour in everyday life or at work, to the protection and improvement of the human habitat.⁷

If we take the Australian CDC's definition of environmental education, it

... is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulating of a code of behaviour about issues concerning environmental quality.⁸

When we examine these statements closely, we see that environmental education is much more than knowing about or understanding the environment and its problems. It is also defined as process - a process of recognising values, of developing respect, of developing an attitude of concern to participate, and of acquiring skills in solving environmental problems. Furthermore, it involves responsible decision-making, formulation of a code of behaviour about issues and adoption of suitable behaviour for life's activities.

These process, affective and behavioural elements are very unique to environmental education. I believe that ^{it}is these humanistic characteristics involved in problem-solving and associated decision-making that distinguish environmental education from environmental science or any science subjects taught in school. While problem-solving in science is based on objectivism, quantification and generalisation, problem-solving and decision-making in environmental education is of a different kind. Based largely on thinking through problems in a qualitative ~~way~~ it has to take into consideration a number of pressures and these include those which are social, economic, religious, cultural and political. And many of these decisions are not always generalisable over time due to social change.

Consequently, ~~environmental education to be effective must reflect~~ these characteristics. Its objectives must include those which aim not only to provide the knowledge for understanding problems or the right attitudes and values with respect to social issues but to develop in students an ability to transfer their knowledges and skills to new situations or solve new problems, and, more importantly, to have students personally involved in real environmental action. It is this latter component which is mostly lacking in current efforts in the field of environmental education. It is also this particular aspect which will pose the greatest difficulty for the development of environment education in its ideal form in the schools.

4.2 Selection of Content

Logically speaking, the content of environmental education should be drawn from the environment and focus on real-life situations and problems. But what aspects of the environment and what problems of environment should form the substance for study? The environment, as it is conceptualised today, includes the social, cultural, economic, and spiritual dimensions of society and the biological and physical aspects of the natural environment; it is thus multi-faceted and covers very wide areas of concern. Obviously, not all bio-physical aspects and socio-cultural concerns can be included in environmental education, in fact a large number of social issues are not suitable materials for discussion at the school level. A selection of areas would need to be made and the following three criteria would be useful to guide the choice.

1. Importance and urgency of areas to society

The priority concerns of society are reflected in the policies, Acts, Regulations and national programmes directed to the social, cultural, economic and environmental development in the country. Of particular importance are the National Economic Policy, RUKUNEGARA or the National Ideology, the National Education Policy and the National Environmental Policy. Interpretations of policies and of the emphasis given to development programmes such as agriculture, health, rural development, housing development etc. would have to be made so as to provide the necessary guidelines for curriculum needs.⁹

2. Suitability in terms of students - their needs and stages of intellectual and emotional growth

At the primary level, areas of the environment chosen for study should be those which are immediate and useful to children. These would include learnings about self, about people, things and places in their surroundings and about events that impinge on their lives. Whatever issues are studied, they should be dealt with in concrete terms and at a level consistent with their cognitive abilities and emotional maturity. At the secondary level, the treatment of environment should take advantage of previous learnings so that students will achieve higher levels of understanding about the environment. Issues of concern to the wider community and at regional ^{or} global level can be introduced. Students at this stage have better readiness in terms of

intellectual and emotional strength to deal with more structured knowledge, social meanings of problems, different value positions and the conflicts which characterise many social problems.

3. Appropriateness of areas

There are at least two issues related to this criterion. The first issue is whether the content for study is controversial and is likely to create severe conflicts in terms of people's religious beliefs or cultural traditions. There are ideas and concepts e.g. survival of the fittest which can be dealt with in an objective or pragmatic way but which at the same time contradicts with spiritual traditions. The question is whether the curriculum should avoid such areas of study.

The second issue has to do with appropriateness of the content in achieving the objectives, short-term and long-term, of environmental education. Aims and objectives need to be elaborated in fairly specific terms so as to facilitate choice, of areas, not only to secure a balance between cognitive content, affective and skill development but also to ensure that the various fields of disciplines, science and social, are represented adequately in the study.

Determining the content of environmental education does not end with the identification of broad areas for study. The biggest difficulty facing the curriculum developers is one of drawing up the sets of knowledges, attitudes, values and skills to be learned and the strategies by which they are to be learned. In this task the problem is not so much with picking out theoretical knowledge from established disciplines about the environment but with obtaining specific information relevant to social issues and problems. For instance, we have scientific information about pollution e.g. harmful effects of carbon monoxide or lead compounds but information about the state of pollution as a social problem is generally not readily available to the curriculum developers. The lack of resource materials can jeopardise the development of an appropriate environmental education for school. There is thus a need for more written information about environmental problems which students, teachers and educationists can use. Moreover, there is also the need to have expertise from outside the education system, particularly environmentalists and professionals in areas like health and nutrition, public and social services, agriculture,

drug control and consumerism, assist the curriculum developers in developing environmental education for schools.

4.3 Curriculum Design Strategies

Another important condition to fulfil in curriculum development relates to finding suitable strategies of organising content for teaching. What are the possible approaches to environmental education and how do we structure the curriculum?

There are three main strategies to environmental education though there are combinations of all these.¹⁰ The first is to have environmental education as part of a course, for instance a topic, a unit or a project. The second is to create a new course or subject for it. The third is to have environmental education as a dimension in which the knowledges and concerns associated with environment permeate the whole school curriculum.

All these strategies have merits and can be used to introduce environmental education into our education system. The first has appeal because it is a limited exercise and can be implemented in circumstances where there is a shortage of trained teachers. Project work which involves longer time than is allowed in the scheduled school time-table of forty-minute periods can be carried out after normal school hours.

The second strategy is ideal as new courses designed from scratch would give a true focus or status to environmental education, a focus which is a powerful force for the integration of various subjects and their relevant concepts. The single subject approach has so far been used only at the tertiary level. At the universities such as National University and University of Malaya new subjects in environmental studies have been introduced recently.

The integration model can also be used at the primary level which does not have the constraints of single disciplines and where general education is its prime emphasis. 'Alam dan Manusia' (Environment and Man) a new course currently being planned by the CD for standard 4-6, would offer the opportunity to utilise this approach and produce an integrated curriculum involving concepts from science and social science fields.

The third strategy, the linkage-infusion model, is appropriate for the secondary level where the school curriculum is discipline-based and already too overcrowded to tolerate the addition of another subject. There are other benefits in this approach. The environmental influence in all subjects would enrich the social relevance and usefulness of existing courses. It will also provide

a wider range of views on different aspects of environmental issues, thus facilitating understanding of the complex environment from an interdisciplinary point of view. Involving all subjects and therefore all teachers, the approach will assist in unifying teachers around a common interest in environmental education and hence greater communication among them toward interdisciplinary work.

Let me illustrate in diagrammatic form¹¹ how the two models described above work in terms of content selection and distribution in curriculum development. In the integration model shown in figure A the environmental issue or conceptual theme can be analysed for the potential concepts that need to be acquired. Groups of concepts can then be selected from the pool to form the content at each level.

It can be seen that the content at all the levels is based on the issues or themes selected for study. Also the content at each level could be a grouping of units, sub-themes, topics or modules.

In the linkage-infusion model, environmental issues are identified and then linked to the already existing curriculum content either in one particular subject like science or in all subjects. The process is represented in figure B.

It can be seen that certain issues or themes do not link with certain lower level of curriculum but can be linked to a higher level. Also some concepts in the curriculum may not link with any issue or theme. If any issue chosen for study but finds no link with concepts at any level, then the curriculum content must be enlarged to accommodate the concepts of the issues identified.

Teaching-learning Strategies and Methods

The requirements of teaching and learning styles in environmental education are to a large extent determined by its characteristics and aims. In the early part of this paper it has been pointed out that environmental education is fundamentally a practical education oriented towards a solution of the problems of the environment or at least to make pupils better equipped for their solution. In view of this problem-solving characteristic of environmental education, it appears that there are some teaching-learning strategies which are particularly appropriate, though the whole range of existing techniques could be used. These strategies would be those that could facilitate the more pragmatic approach to problem-solving and would lead not only to awareness of problems but to affective development, active involvement in the consideration and solution of real problems and experience of a wide range of environments.¹²

Figure A : Multidisciplinary - Integration Model

709

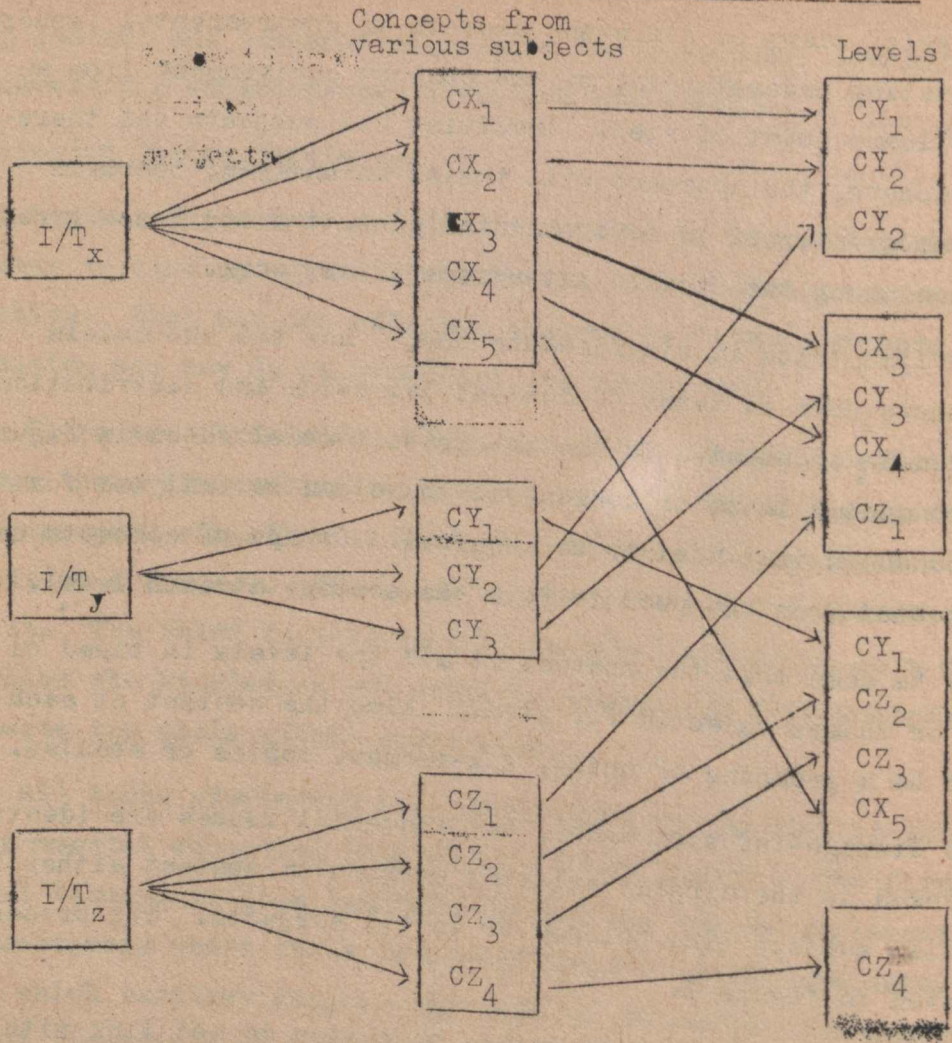
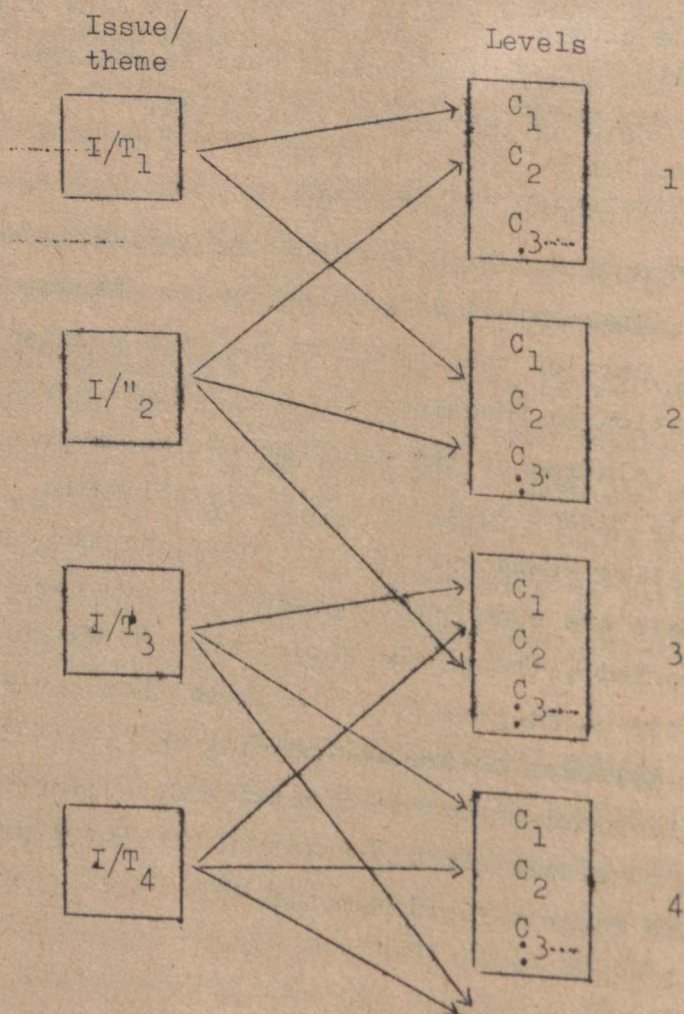


Figure B : Linkage-Infusion Model



A number of action-oriented methodologies has been recognized to be effective and these include conceptual and value clarification, group discussion, gaming, simulation, role-playing, field studies, experimental workshop and action research.¹³ Time does not permit me to describe these methods and their advantages. However, I would like to point out that there is a necessary condition in the teaching-learning process, especially, with respect to affective development, which must prevail for these methods to work and that is, the relationship between students and teachers should be open. Students should be encouraged to express their own feelings, concerns, beliefs, interests and aspirations and teachers should provide a non-judgemental and supportive atmosphere for questioning and open-ended discussions when differing values are clarified and conflicts explored. Teachers should accept differences in values and attitudes and thus help students recognise such differences among themselves. Obviously discussion and group interaction skills will play a key role to establishing an understanding relationship and these skills will need to be developed by both teachers and students.

The use of active teaching methods would imply that the appropriate teaching materials are available to teachers and students. These include educational and simulation (or computer) games, environmental kits, audio-visual materials dealing with major problems of the environment (health, pollution, conservation of natural environment and problems of urban environment, etc.), and other materials directed towards problem solving and which require student's participation.

I must say that at this time we are very short of such materials and the development of teaching materials that favour active teaching approaches should be a priority need in the future development of environmental education.

4.5 Evaluation of Learning

It is a truism to say that students will learn according to how they are assessed. If environmental education is as I have described or implied above, then the evaluation in environmental education must cover competence in problem-solving, decision-making and the organisation of action, as well as the values which determine the orientation of individuals towards the environment. This is not to suggest that evaluation of cognitive achievements is unimportant but because so many of the aims of environmental education are attitudinal and behavioural, techniques must be developed which are compatible with these objectives. In short, evaluation should be based not only on assessment of the outcomes of learning e.g. factual knowledge,

solutions of problems or an attitudinal change but, more importantly, on the learning processes by which such outcomes come about. This would include the skill-behavioural component of environmental education, for example, how students identify problems, how data are collected, how observations are represented or how problems are solved. Such process imperatives are not easy to evaluate through paper and pencil tests or through questionnaires; other less formal and more personal procedures should be used and these could include checklists to be used while activities are in progress, anecdotal records and interviews with students.

5. The Preparation of Teachers

The teacher is the key to any curriculum change and the preparation of teachers should become a priority need as part of the development of environmental education. The programme of teacher education would be expected to meet the requirements for environment teaching. It should in particular familiarise teachers with the appropriate aspects and problems of the environment they are to teach. It should provide a basis of training which would enable them to incorporate environmental education effectively into their teaching activities.

But, the pre-service training curriculum, as it exists, either at Teacher Training Colleges or at the Universities, cannot be considered adequate for these purposes. In the last few years some environment-linked subject matter has been incorporated into the academic courses of the teacher training programmes in both the science subjects (e.g. biology, physics, chemistry) and social science subjects (e.g. economics, geography, home science). But this incorporation has been done on an intradisciplinary basis and the Science and Social Science fields are therefore not interlinked by it. The training of teachers is very much limited to certain disciplines and consequently the training cannot provide the wide range of knowledges, skills and values from the diverse disciplines that are required for the development of interdisciplinary approaches. Moreover, the training of teachers tend to be theoretical and when environmental problems are studied, they are to a large extent restricted to certain environmental problems. e.g. health, and specific ecological studies, which may have limited relevance to those problems they are expected to teach in school. The emphasis on knowledge often hinders the development of the appropriate experiences, process skills and confidence teachers require for dealing with environmental issues. It is the acquisition of 'ways of knowing' that is of paramount importance and which should form the focus of training of the environmental education teacher.

It is clear then that the training of environmental education teachers cannot rely on pre-service training alone and the training curriculum structures need to be modified to meet the needs of environmental education. There is thus a strong need for the continual upgrading and development of teachers through systematic in-service training.

What are other specific skills relevant to the field of environmental education which teachers ought to have? The answer to this question can perhaps be found in the characteristics of environmental education itself. Environmental education has been described as pragmatic problem solving and the development of commitment to issues including following it through to action. The implication of this for teacher education is that teachers must be helped to manage learning environments such that these activities and achievements come about. They will need a range of skills and these include:

1. management of human resources.
2. management of material resources.
3. management of learning situations. ¹⁴

Teachers, by and large, are not expected to know everything about the environment and its problems. But it will be an asset for the teacher to know how to utilise expertise and resources in or outside the school. The kinds of skills involved for this task would include identifying the kinds of resource people available, assessing the motivations, skills, attitudes and values of resource persons, and arranging appropriate learning situations in collaboration with other people. Therefore one of the goals of teacher training must include the development of teacher ability to recognise and understand the contributions that people trained in particular disciplines or specialising in environmental issues can and cannot make in environment teaching.

The recent development of resource centres and field study centres, e.g. National Park, University of Malaya Field Study Centre, brings with it the need to help teachers develop skills in utilising them in the most appropriate way. Teachers should have knowledge about the range of community facilities available and the skills as to how they can be used to achieve these objectives. Of particular importance is the teacher's ability to organise field situations which he may or may not be familiar.

In the management of learning situations, the teacher should recognise that he may not share the same outcomes of learning as the students, especially when social issues are discussed. The interaction abilities which were alluded to earlier has reference in this context, in that the background knowledge possessed by the teacher is

of minor value when the environment is used as a resource for enquiry and exploration.

Conclusion

In the last few years, efforts have been made to develop the field of environmental education at all levels of education - primary, secondary, tertiary, teacher development, postgraduate and non-formal. Some of these initiatives have resulted in the formalisation of new courses or programmes of study and training but much of it, especially those at secondary level, has remained informal. Their effects are therefore difficult to assess.

In this paper, I have attempted to evaluate the state of environmental education in the school, particularly that of the secondary school, so as to answer, in part, the question: is our formal education system meeting the needs of an appropriate environmental education? If answers to this question are to be summarised in a single statement then I would say that the school system is inadequate in meeting the orientations of environmental education and consequently the needs of and concerns of students and society with respect to environment and improvement of quality of life. The reasons for my saying so relate to the curriculum issues I have discussed, and these include:

1. conceptualisation of environmental education is yet to be formulated,
2. insufficient development of curriculum with an interdisciplinary and problem-solving approach,
3. shortage of appropriate teaching-learning materials,
4. lack of incentives for teachers and students for study of environment,
5. insufficient training of teachers to deal with environmental issues, and
6. institutional constraints and school organisation which set limits to the study of environment.

Environment education is, relatively speaking, a new area of concern in the formal education process and there is tremendous scope for the development of each of the areas identified above. While much must be done in the domain of curriculum development and teacher education these efforts can be enhanced if guided by a policy with respect to the introduction of environmental education into the school. Furthermore, because most of these developments

are wide-ranging and innovative, another urgent need is for an increase participation of all parties interested in the environment cause to assist in the resolution of these problems. Action-oriented research and experimentation particularly with regard to teaching strategies and evaluation should be stepped up to produce more base-line data for the curriculum effort.

Footnote

1. Third Malaysia Plan (1976-1980), Kuala Lumpur, Government 1976.
2. Modern Biology for Malaysian Schools: Teacher's Guide, Kuala Lumpur, Longman Malaysia, 1974, p. ii.
3. Curriculum Development Centre, Malaysian General Science Project (Objectives, Rationale and Methods), Kuala Lumpur, Ministry of Education, Malaysia, Feb. 1978, p. iii.
4. Cheong Siew Yoong, 'Environmental Problems and Orientations - A Malaysian Case Study' in Proceedings of the Eighth Biennial Conference of AABE, Quezon City, AABE Secretariat University of Philippines, 1981, p. 189-197.
5. Bridget Chitra Jayatilaka, 'Relevance of the Teaching of Ecology to Environmental Awareness: A Case Study of a Malaysian Secondary School', unpublished M.Ed. dissertation, Kuala Lumpur, University of Malaya, 1982.
6. Jeyasingam, Ratha, Private Communication, 1983.
7. Unesco-Unep, 'World Problems and Unesco's Medium-Term Plan (1984-1989)', Connect, Vol. 7, No. 4, Paris, Unesco, Dec. 1982, p. 2.
8. Curriculum Development Centre, A Proposal for the Support of Environmental Education in Australia, Interim Report of the CDC Environmental Education Committee, Canberra, 1975, p. 2.
9. M.P. Prabhakar, 'Transfer Problems Related to Schools' in Proceedings of the Regional Conference on Environmental Education in ASEAN Universities and Its Transfer, Selangor, Universiti Pertanian Malaysia, 1981.
10. Lawrence Stenhouse, 'Aspirations and Realities in Environmental Education' in Education and the Human Environment, Canberra, Curriculum Development Centre, 1977, p. 38.
11. APEID-Unesco, Curriculum Development: Linking Science Education to Life, Bangkok, Unesco, 1981, p. 50-51.
12. Russell D. Linke, 'Report of Working Party 2' in Education and the Human Environment, Canberra, Curriculum Development Centre, 1977, p. 199.
13. Unesco-Unep, 'The Problem-Solving Approach to Environmental Education', Connect, Vol. 8, No. 2, Paris, Unesco, June 1983, p. 1.
14. John Mayfield, 'Is Environmental Education Teachable? - Considerations for Teacher Education' in Education and the Human Environment, Canberra, Curriculum Development Centre, 1977, p. 92.

Bibliography

1. Unesco, Environmental Education in Asia and the Pacific, Bulletin of the Unesco Regional Office of Education in Asia and the Pacific, No. 22, Bangkok, Unesco, June 1981.
2. Consumers' Association of Penang, Development and the Environmental Crises - A Malaysian Case, Proceedings of the Symposium The Malaysian Environment in Crisis, Penang, March 1982.