

Environmental education and classroom practice: some implications for teacher education

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ABSTRACT

Informal, open, experiential, student-centred classroom styles are seen as preferable for effective environmental education. The paper examines how far and in what ways such styles are employed and what model of teacher education is needed. Three hundred and eighty-one teachers in Hong Kong completed a self-administered questionnaire examining the openness and indirectness of teaching style primarily within a framework of Gagné instructional events. Opening phases in lessons tended to be open, indirect and student-centred but as lessons progressed became more closed, teacher-directed, bookish and examination oriented. The relative inappropriateness of the style adopted is not seen in terms of lack of teacher knowledge but of teacher perceptions of practicality and a tendency to adopt satisficer strategies to accommodate short-term demands. Teacher education needs to take account of the realities of the school and focus on teacher education and curriculum development as one within a process model of teacher training that is appropriate to the needs of environmental classes.

The purpose of this paper is to look at the sort of teacher education which is required for teachers of environmental education given practices which prevail in classrooms. The paper is concerned with the classroom style used by teachers, the possible link between this and the success or failure of implementing environmental education programmes and with the implications for teacher education. This is not a new concern. The Tbilisi conference in 1977 represented a benchmark because it brought together ideas about the emphasis to be given in environmental education, the classroom practices teachers should adopt and, indirectly, the direction teacher preparation should take. It recommended that:

Environmental education should not confine itself to disseminating new knowledge but should help the public question its misconceptions concerning the various problems of the environment and the value systems of which the ideas are a part (UNESCO, 1980, p.26).

Out of this and other statements, the purpose of environmental education came to be seen as centring on the process of developing critical awareness of people's surroundings. As is well accepted now, education for the environment is at the core. This is not to say that there is not a need for knowledge about the environment and for study in the environment, but rather to distinguish means from ends. Such a goal, stressing values and attitudes and the formulation of a global ethic (Stevenson, 1987), presumes an informal, open, participatory, experiential, thought-inducing, student-centred classroom style (Tomlinson, 1986).

The shortcomings of an over-emphasis on cognitive objectives, and in particular on acquiring knowledge about the environment at the expense of the affective and behavioural, is well recognised (Huckle, 1983). This presents a challenge for teacher education which is considered by UNESCO (1991) as the priority of priorities in environmental education in the late twentieth century. In this teacher education context, evidence from Tilbury (1993) indicated that the actions and attitudes of teacher trainers bear considerable responsibility for the present situation. However, there is little empirical research evidence to inform teachers and teacher educators about what are the most effective approaches in the classroom. Where findings exist they are often contradictory; for example, some workers have found that the use of simulations enhances environmental awareness whereas others have suggested they add little (compare, for example, Bottinelli, 1980 and Fennessey et al., 1974). One problem with such studies is that they frequently ignore the context of the classroom environment as a whole, and thus it is not surprising that seeming contradictions arise.

While there is little evidence to inform classroom activities and style, the strategies used in practice are crucial. In many school systems centralisation has meant that the aims and objectives of environmental education are not a matter for decision by individual teachers. Environmental objectives for schools, as with those for other subjects, are given in the official documentation of the intended curriculum. In most cases, engendering appropriate environmental values is at their core even if they are always not so readily apparent at the level of specific learning targets. The curricular problem, particularly where curricula are developed centrally rather than within individual schools, is the way the objectives are interpreted and the sorts of classroom experiences teachers feel are appropriate as a consequence. Smith (1985) commented that one of the strongest influences on teachers' planning of lessons is their perception of the subject matter and the type of knowledge it represents. The perceived priorities of teachers lead to the adoption of particular classroom approaches. At the same time, the approaches which teachers feel most comfortable with influence that which they perceive as feasible to teach and thus by implication the objectives they stress. These interactions, and the compromises they inevitably entail, are major factors influencing classroom activities and can lead to a mismatch between the intentions of the environmental curriculum and what is implemented in reality. Fullan and Pomfret (1977) highlighted this in pointing to the importance of value internalisation as a prior condition for the acceptance of pedagogical change.

The paper uses data by Wong (1992) from a case study of classroom style as perceived by geography teachers in Hong Kong when dealing with environmental topics to address the issue of the training of environmental education teachers. However, the actions of teachers in solving questions about how they should organise their work in the classroom cannot be separated from the broader issue of the system in which they work. Thus it is useful to first understand the educational context of the study which is described. Of particular importance in the context of environmental education in Hong Kong is the nature of the education and external examination systems. Thus, before looking at teaching style, it is first necessary to provide some background on education and assessment in Hong Kong.

THE HONG KONG EDUCATION SYSTEM AND ENVIRONMENTAL INITIATIVES

Hong Kong operates a highly centralised education system with territory-wide curricula for all but the few children in international schools who follow programmes from their home country. As Morris and Marsh (1992) pointed out this top-down orientation leads to problems that are products of any bureaucracy but also creates a positive means of providing uniformity of provision, common goals, and of protecting schools from the demands of various pressure groups. Nevertheless, schools have control over matters such as choice among approved texts, use of non-text materials and the classroom approach to be adopted in an attempt, as McClelland (1991) put it, of grafting increased teacher professionalism onto a centralised bureaucratic system. Teachers have largely been kept out of the policy making arena and have accepted a dependent role. Where teacher participation occurs in central planning committees, it usually does not comprise a leading role. Curricula emanating from those committees are nominally only recommended curricula; however, for all practical purposes, they are mandatory – such are the power relationships within the educational system. This is not to imply that existing recommendations do not constitute good practice or awareness of worldwide trends. The main problem is the slippage between general policy aims and implementation as teachers often do not perceive ownership of proposed changes.

Within this framework environmental education has been long in gestation and slow in uptake. Educational provision has often been seen largely in terms of creating infrastructure for the economy (Sung, 1989) and, consequently, new initiatives in the 1960s and 1970s were directed towards technology education (Lee, 1991). Environmental quality was viewed as a luxury. Environmental education was marginal despite environment being nominally an organising concept within the 14-16 and 16-19 geography curricula and warranting a place in biology. However, by the mid-1980s, air and water pollution in the territory reached such a level of public concern that the Governor of the time, David Wilson, promoted the environment as a central issue and it was added to the educational agenda.

The Education Department of the Hong Kong Government responded to the challenge with a number of initiatives both of a cross-curricular nature and within subjects. These included the promulgation of a set of cross-curricular guidelines, the introduction of an environment module within a grade 12-13 Liberal Studies programme and an ill fated grade 10-11 Environmental Studies course for non-academic children. Most progress has been made within traditional school subjects and in particular within geography; hence the focus of the Wong study.

Overall, the curriculum development process in which these initiatives have arisen has many similarities with the authority decision-making framework suggested by Rogers and Shoemaker in which teachers have no option but to implement, whether or not they accept the implications of new curricula. As Marsh and Hill (1984) found, in an analogous situation in Western Australia, the only action open to teachers is adoption of different ways and levels of implementation of the new environmental components in the curriculum which accord with their views of the job. The outcomes of these appear in the classroom teaching style they espouse.

EXTERNAL EXAMINATIONS AND THE IMPLEMENTATION OF ENVIRONMENTAL EDUCATION

In the Hong Kong education system, there are external examinations at 16+ years, the end of grade 11 which is the point at which most students leave formal education, and at 18+ years (end of grade 13). In general, most students staying through a particular level will take the relevant examination. At grade 11, this is about 90 per cent of the age cohort and 25 per cent at grade 13. The influence of the examinations, however, is felt either directly or indirectly at most stages of secondary education (grades 7-13) irrespective of subject area.

The backwash effects of public examinations have had a major influence on the nature of environmental education in Hong Kong schools. Evidence for this comes from two examples. Firstly, the Environmental Studies programme for grade 10-11 noted earlier failed to receive support from schools because initially it was deemed a non-examination course for non-academic students. Head teachers felt it would not be accepted by parents and rejected it. Secondly, when the grade 10-11 geography curriculum was revised in 1985 and an environmental perspective was adopted using an issues-based framework, only 25 per cent of marks in the examination were allocated to the assessment of students' knowledge and awareness of environmental issues. Nevertheless, whilst this was less emphasis than some would have given, it was now clear what was expected in the classroom and the examination can be seen to have had a potentially positive role in affecting curriculum change.

Examinations, as has been found in Hong Kong, are often critical in deciding exactly what will be taught, with what perspective and with what strategy, particularly in an absence of specifically stated objectives for examiners to follow. In these circumstances, examiners may tend to exercise

personal predilections for certain types of questions. Often questions mirror previous practice and consequently new initiatives are not supported in which case inappropriate messages are sent out to schools. As a consequence, questions tend to be asked about what the environment is like and why and how it has developed in that way. The ideological issue of how the environment ought to be handled, which would require a more open indirect style of teaching, is largely ignored.

THE STUDY

Research method

From what has been said about the education system and the public examinations, it is clear that environmental education teachers receive conflicting signals of what to do. Consequently, during 1992 a study was made of the teaching styles used in environmental education. A self-reporting questionnaire survey was conducted in Hong Kong which complements work by Spork in Queensland, Australia (Spork, 1991) and by Lee also in Hong Kong (Lee, 1993). Whilst Spork's and Lee's studies were at the curriculum/programme level, Wong's investigation concentrated on the lesson as the unit of analysis. The conceptual framework underpinning the study was based on Gagné's eight elements within an instructional/teaching event and Adams' organisational characteristics of a lesson. The use of a Gagné framework is not without its difficulties, not least because of its original focus on the cognitive domain. However, it offers the advantage of providing a framework for examining the various elements of a lesson. The twelve criteria in total are given in table 1. Sixteen situations were created to examine teacher behaviour on an open-closed continuum with respect to each of the 12 elements listed. Participating teachers were asked to select one of three likely alternative behaviours of varying degrees of openness. A background questionnaire was also included.

Table 1: The framework for analysis of lessons (Source: Wong, 1992)

1. Activating motivation
2. Informing learners of objectives
3. Directing attention
4. Stimulating recall
5. Providing learning guidance
6. Enhancing retention
7. Promoting transfer of learning
8. Eliciting performance and providing feedback (based on Gagné, 1975)
9. Organisational differentiation
10. Control source
11. Control mode
12. Mode of interaction (based on Adams, 1970)

The questionnaire was sent to all Anglo-Chinese and Chinese middle schools in the territory offering the grade 10 and 11 environmentally based geography Certificate of Education course. These teachers were selected because, in the absence of a separate environmental studies course, the grade 10-11 geography reflects what is probably the most environmentally explicit programme within

the school curriculum; moreover, it is widely studied by about 35 000 students each year. Some 381 questionnaires were returned from 282 out of 388 schools offering Certificate level geography. This gave a return rate of 73 per cent.

Nearly two-thirds of the teachers who replied were women and most were experienced teachers with between six and twenty years of service. Most were professionally qualified graduate teachers who held some sort of responsibility post in their schools. Few, however, were either directly involved with environmental groups outside the school or engaged in environmental protection activities within the school. In other words, the environmental commitment among the teachers who replied was, as might have been expected, very variable.

Results

Percentage responses to the behavioural options for each situation are given in figure 1. In getting the attention of students and motivating them to become engaged in environmental topics, teachers see themselves and their teaching style as largely student-centred. There is indication of a move to resource-based learning. Similarly in discussion, when attempting to stimulate recall of earlier learned ideas, the approach is to provide encouragement rather than criticism. The appearance of openness is also apparent in organising classes where the concept of differentiated student work by task is accepted and where free communication between students is encouraged within a democratic approach to issues of classroom rules. Such responses are indicative of a broadly open approach to running lessons in which an indirect manner of teaching is adopted.

There were, however, contradictions. Overall, learning tended to be seen in a compartmentalised way. Integration within the subject area and thus, presumably, across the various environmental issues under discussion, was not strong. Integration across subjects was rare indeed. Values development, when it occurred, centred on the more neutral values analysis; action learning was not a preferred option. Nearly one-quarter saw values inculcation as the way forward. In assessment exercises, teachers rarely tended to emphasise the affective but rather to concentrate on the cognitive. Homework was as often examination-orientated (and hence, as a result of the formal nature of public examination questions, focused on knowledge) as it was directed towards students applying ideas to their daily lives. The examination was clearly a major influence on many teachers and the cognitive rather than values or attitudes orientation of most questions seemed to have an important effect on the sorts of work set when attempting to consolidate learning. The result is likely to be the development of a conventional and politically neutral form of environmentalism.

DISCUSSION

The impression to be gained from these observations is one of a mixture of styles within a lesson. At the beginning of a lesson, the teachers tended to be open, participatory and experiential. Pupil involvement was encouraged. However, as lessons progressed, the style became more didactic, teacher centred and "bookish". There was concern to ensure that points were covered and that pupils received suitable preparation for formal tests lying ahead.

Figure 1: Percentages of Teachers by "Most Likely" Course of Action
(Source: Wong, 1992)

Classroom Situation	%	Classroom Situation	%
(1) Activating motivation:		(9) Transfer of learning (Valuing Process):	
A. Extrinsic (Punishment)	2.7	A. Vertical transfer: inculcation	22.9
B. Extrinsic (Reward)	18.0	B. Lateral transfer: value analysis	67.9
C. Intrinsic	79.3	C. Lateral transfer: action learning	9.2
(2) Informing learners of objectives:		(10) Promoting transfer of learning through integration of subject matter (s.m.):	
A. Not informing objectives	10.1	A. Vertical transfer: separate s.m.	56.6
B. Informing objectives explicitly	18.0	B. Lateral transfer: separate s.m.	33.6
C. Informing objectives implicitly	71.9	C. Lateral transfer: integrated s.m.	9.8
(3) Types of objectives:		(11) Eliciting performance by assignment:	
A. Irrelevant objective	4.0	A. Cognitive and exam-oriented	42.5
B. Cognitive objective	82.2	B. Cognitive and affective	36.7
C. Affective objective	13.8	C. Affective and action learning	20.8
(4) Directing attention (teaching approach):		(12) Providing feedback:	
A. Exposition	29.3	A. Very delayed and summative	9.8
B. Guided teaching	45.3	B. Delayed and less formative	16.2
C. Open inquiry	25.4	C. Immediate, prompt and formative	74.0
(5) Stimulating recall:		(13) Class Organisation:	
A. Provide no cue; give criticism	5.8	A. All pupils work on the same task	1.5
B. Provide no cue; give direction	23.3	B. Different groups, same task	15.0
C. Provide cue; give encouragement	70.9	C. Different groups, different task	83.5
(6) Providing learning guidance:		(14) Control source (Leadership style):	
A. Verbal statement	23.3	Class rules determined by	
B. Photos, slides and videos	70.9	A. teacher alone. (Authoritarian)	4.6
C. Field study	5.8	B. teacher and pupils. (Democratic)	91.7
(7) Enhancing retention by assessment		C. the pupils alone. (Laissez-faire)	3.7
A. Cognitive and structured	37.6	(15) Control mode: The rules in the class state	
B. Cognitive and open-ended	44.7	A. what must be done.	3.4
C. Affective and open-ended	17.7	B. what must not be done.	56.3
(8) Enhancing retention by homework:		C. what may be done.	40.3
A. Didactic	4.0	(16) Interaction mode:	
B. Examination-oriented	50.44	A. Teacher dominated communication	31.8
C. Open-ended (daily life example)	5.6	B. Teacher-pupil communication	20.5
		C. Free communication among pupils	47.7

It would be easy to dismiss the approach as largely incompatible with the stated goals of environmental education and to suggest that the teachers showed little appreciation of what is advocated by environmental educators as the preferred style. Hong Kong teachers are by tradition didactic. This is perceived as the accepted "Chinese way" of teaching in which formal schooling is equated with knowledge acquisition, a view supported by Au (1989) in his study of the expected role of teachers in Hong Kong. The mixture of a traditional teacher-centred approach and a more open student-centred approach exhibited in lessons perhaps reflects the cosmopolitan atmosphere of Hong Kong. Perhaps more importantly, the style observed reflects the way teachers do in fact understand the need for an open, participatory, questioning approach. They are not unaware of what might or could be, but within the system in which they work they make compromises. A similar conclusion was drawn by Ballantyne et al. (1993) in a study of

geography teachers in Queensland. What is taking place are the strategic adjustments discussed by Etheridge (1989) with reference to the early years of teaching but which in reality continue throughout the professional lives of teachers to one degree or another. Teachers may rarely read environmental education journals but they are well aware of the broad issues involved in teaching values-laden subjects. The findings express what teachers see as the necessary approach, given their confidence and knowledge to implement change, the situation in their schools and the expectations of schooling by Hong Kong society. They are pulled between a vision of how environmental topics can be taught and the more pragmatic realities of the present. Satisficer strategies which accommodate short-term needs dominate. That is, teachers adopt approaches which, although sub-optimal in curriculum terms, constitute personally satisfactory alternatives given their perceptions of what is desirable, acceptable and feasible and their views about teaching as a job.

Environmentally committed curriculum developers, in their enthusiasm, often seem to forget or ignore these realities. Fullan (1991) has even gone so far as to claim that strong commitment to reform from outside the school setting constitutes a major barrier to change. He argued that the adage "where there is a will there is a way" is definitely not apt. With great simplicity, he noted that often there is an abundance of wills but they are in the way rather than to the way. Teachers undertaking environmental work in schools are faced with many competing ideas of what is the most appropriate way in which they should organise their lessons. There is the fallacy of rationalism that change can be brought about by force of argument concerning what is the "right way" to conduct lessons. Teachers are faced with a complex interacting, often conflicting, set of demands, and not the least among these is the fact that the style being advocated in environmental education differs radically from that adopted in most other subjects on the timetable. It is not surprising that what is reported about actions in classrooms is inevitably some form of compromise.

IMPLICATIONS FOR TEACHER EDUCATION

The points made so far might indicate that there is little which can be done in teacher education to effect change in the practices of environmental education. This would be far from the truth and, indeed, much attention has been given, particularly by UNESCO, as to what might be done. Fien (1993) recognised four approaches for teacher education institutions: (i) specialised courses in environmental studies (ES) with or without associated programmes in environmental education (EE); (ii) integrated ES-EE courses; (iii) separate courses in Environmental Education that encourage infusion into various subject areas and (iv) direct infusion into all curriculum subjects.

Whatever organisational structure is used, careful attention needs to be paid to the conditions which bring about change. At the heart of effective curriculum reform is the process of clarification in which teachers as individuals work out their own meaning of what is being proposed (Fullan, 1991). At the core is a process model of teacher education. The process will

involve ambiguity. Its reflective nature will put emphasis on educational aims and consequences as well as the new technical skills to be used in the classroom (Hart, 1990). It will inevitably take time. It is necessary to think in terms of years not months. Illustrative of this is a recent environmental initiative in Hong Kong. A new issues-based Liberal Studies environment module for grades 12/13 has been in existence for three years with support from INSTEP courses but only now are there indications that progress is being made. The question of the time span required for success may be a particular potential problem in Hong Kong. Here there is a high rate of teacher turnover and no sooner are teachers trained than many leave, so that no pool of professionals accumulates to create the critical mass necessary for change.

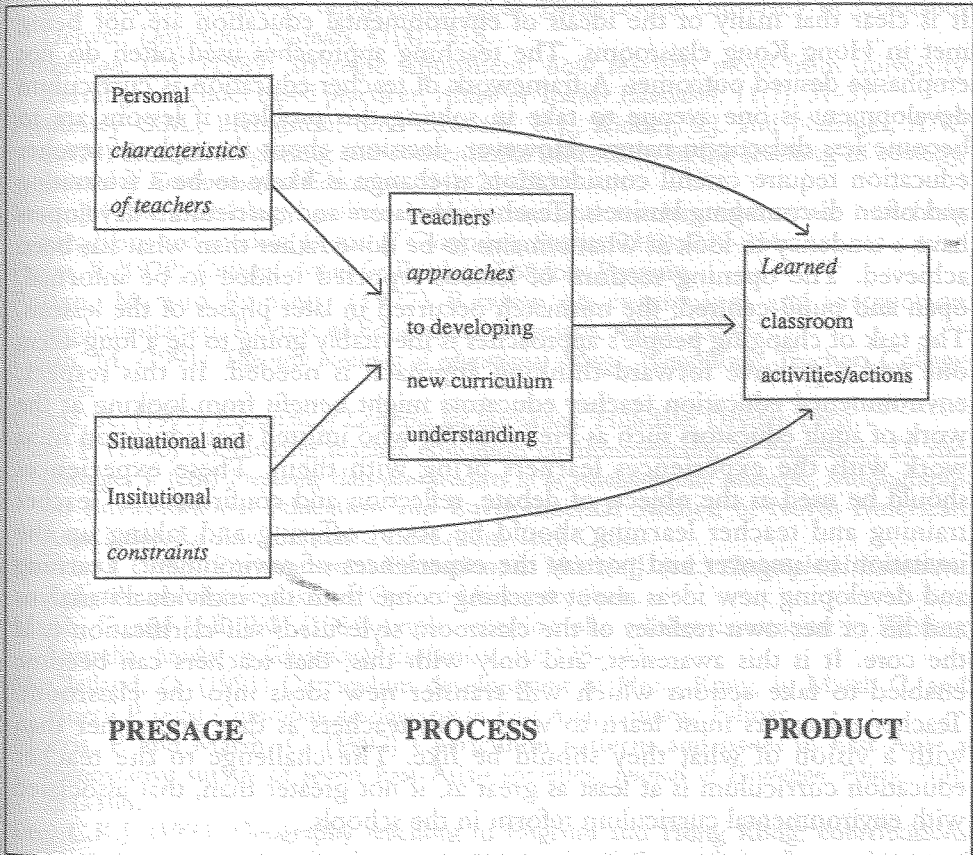
What form should the preparation of environmental education teachers take? No amount of knowledge on the part of the teacher will ever make it totally clear what should be done in the classroom. The knowledge base is often insufficient and requires attention, but the emphasis needs to be on how teachers act. Robottom (1991) argued that teacher education must help classroom practitioners develop approaches which are markedly different from those associated with traditional teaching styles. For example, approaches are needed which see acquisition of knowledge about the environment as the basis for identifying problems for investigation and action. Ballantyne and Oelofse (1989) similarly suggested major changes would be needed, noting the co-operative interdisciplinary nature of much of environmental education but its general absence from schools.

Decisions by teachers about classroom action and adopting new practices are made on the basis of a combination of valid knowledge, political considerations within the school and within the education system in general, and through on the spot, intuitive decisions about how to get the lesson done. In a technocratic society such as Hong Kong, it is all too easy to take a short-term mechanistic approach to the training of teachers involved in environmental education. If teaching in the school needs to be informal, open, participatory, experiential and thought-inducing, then, so does the education of teachers. What is needed are deep approaches to learning concentrating on the meaning of things rather than surface learning approaches. Relativistic positions to new ideas and skills need to be promoted rather than absolutist stances. In short, a metacognitive base to teacher learning is required in which teachers are encouraged to become aware of their own thinking, decision making and actions rather than just the accepted wisdom about how change takes place in an ideal world. Self-awareness and critical reflection are at the heart of helping teachers to control and improve their own cognitive abilities which they bring to the teaching task.

Fien (1991) has drawn attention to the three dominant paradigms of teacher education proposed by Kirk, namely: traditionalist/craft, rationalist/applied science and radical/critical. These are important for they define the philosophical position of the education/training event. However, they only go so far. It is an unfortunate reality that discussions of models of teacher education generally hold little significance for classroom practitioners trying to develop new concepts and skills. If we are not careful there is a risk of falling into the trap Fullan (1991) noted of not taking sufficiently into account the realities of

the teacher. Another possible perspective on teacher education is to look more generally at the issue in terms of the teacher learning process. This is particularly appropriate in the context of teacher education for curriculum reform.

Figure 2: A 3P model for teacher education which focuses on curriculum and teacher development (based on Biggs and Telfer, 1987, p.153).



The starting point should be that teacher educators work with the experiences that teachers bring. Teachers learning new ideas bring to school-based, or institutional, training courses a wide range of beliefs and understandings, attitudes to change, perceptions of position, priorities, etc. These teacher-as-a-learner characteristics interact with the conditions of the learning situation such as the philosophy, organisation and methods used to give rise to new teacher understandings of their jobs. In this context the 3P (presage, process, product) model of learning also offers potential as a model for teacher education which focuses on curriculum and teacher development (Figure 2). The presage factors in the model are independent of the immediate change situation and are of two kinds: factors brought in by the teacher in training and factors which reflect the learning environment and institutional

constraints. The process element encapsulates the approaches to developing curriculum understanding and the product refers to the learned changes in classroom activity which arise as a result.

CONCLUSION

It is clear that many of the ideals of environmental education are not being met in Hong Kong classrooms. The teaching approaches used often do not emphasise desired outcomes. A framework of teacher education as curriculum development is one avenue to take in solving this problem if lessons are to become less didactic in nature. However, decisions about the style of teacher education require careful consideration as change is likely to be a frustrating and often discouraging business. Teacher educators and curriculum developers have a tendency to look at what remains to be done rather than what has been achieved. The opening sections of lessons reported tended to be informal, open and pupil-centred; the mismatch occurred in later phases of the lessons. The task of changing people's approaches is inevitably going to be a long-term one and a positive forward-thinking approach is needed. In this respect, environmental education teacher educators might benefit from looking at the work of adult educators such as Freire (1972) who insisted that education must work with the experiences learners bring with them. These experiences should be used as the objects of debate, reflection and confirmation. Teacher training and teacher learning should be about offering and taking up the invitation to uncover and portray the experiences of environment. Learning and developing new ideas about teaching come from the individual's analysis and his or her own realities of the classroom style used; self-clarification is at the core. It is this awareness, and only with this, that teachers can become enabled to take actions which will transfer new ideas into the classroom. Teacher educators must learn to work with teachers as they are, rather than with a vision of what they should be like. The challenge to the teacher education curriculum is at least as great as, if not greater than, that associated with environmental curriculum reform in the schools.

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