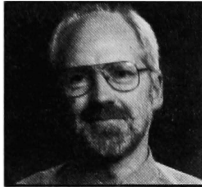


The Environmentally Educating Teacher: Synthesis of an Implementation Theory for Pre-service Courses

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A B S T R A C T

This paper sets out to establish a tentative implementation theory which can inform the work of teacher educators working with novice (student) teachers in their initial professional development related to environmental education. The paper begins with an exploration of the problem of how to encapsulate environmental education within pre-service programs by looking at attempts over the years to encourage and stimulate the professional development of the environmentally educated teacher through pre-service programs. The paper then reports on research carried out by the method of deliberative inquiry which examined the work of two environmental education initiatives: the OECD-funded ENSI project, a co-operative curriculum development program based in primary and secondary schools; and the European Union-funded EEITE program, a development initiative based in universities offering pre-service courses in eleven European Union member states. The paper discusses how ENSI's aims and guiding principles and EEITE'S organizing principles, key elements and program characteristics were considered and a tentative implementation theory established. This theory, it is argued, constitutes a critical framework of process skills and values which can inform and guide the inclusion of environmental education within pre-service teacher education programs. The paper ends with a call for a critique of the theory presented.

The importance of pre-service teacher education to the realization of environmental education goals was highlighted in the 1970s through, for example, the 1971 IUCN conference in Switzerland, and the 1975 international Belgrade workshop. The latter saw teachers as one of the principal audience of environmental education and suggested that environmental education should form a core part of pre- and in-service teacher education programs. The IUCN conference called for well-designed environmental education programs to be developed with the aim of educating teachers. The Belgrade Charter gave rise to a series of initiatives over the next few years which attempted to develop principles for the design and development of a teacher education program of study which includes environmental education. The UNESCO inter-governmental Tbilisi conference in 1977 was a seminal event in bringing to the fore the crucial role of teacher education. Here government ministers unanimously agreed that environmental education should be an obligatory part of both pre- and in-service teacher education courses, and considered as a priority activity. One of principles set out at Tbilisi was the need to strengthen ordinary pre-service and in-service training courses in order to allow teachers to develop the capacity to incorporate an environmental component in their teaching activities. The Tbilisi declaration called for national programs of action, and its resolutions 10 and 11 said that such programs should include a basic level of in-service and pre-service training which would enable teachers to incorporate environmental education effectively into their activities. For more detailed discussion of these

developments, up to and including the UN Rio Conference (UNCED), see Tilbury (1992) and Fien (1994).

The need for coherent programs of environmental education in all aspects and phases of education has also been argued persuasively by a number of national governments, supra-national bodies and non-governmental organizations. Environmental education does not appear to have been introduced anywhere into pre- or in-service teacher education courses in a consistent or coherent fashion. The literature provides a recurring testimony to the failure to achieve these goals as in, for example, UNESCO (1978), Williams (1985), UNESCO-UNEP (1992) and QBTR (1993). Although there is a range of factors at work, the author's experience suggests that four issues are particularly significant:

- the lack of a shared view of what environmental education is or ought to be within pre-service courses, and the lack of an agreed set of goals
- the absence of an understood and agreed pedagogical approach to work with novice teachers in this aspect of the curriculum
- too great a focus by teacher educators on knowledge transmission without sufficient, if any, use of researched, learner-focused, or interdisciplinary approaches
- an insufficient consideration of the professional competencies needed by novice teachers for their work in schools

Significant recent initiatives

The International Environmental Education Program

There have been a number of attempts to define the competencies which an environmentally-educated teacher would need. Prominent amongst these was UNESCO-UNEP's International Environmental Education Program (IEEP). This resulted in a series of publications which included Wilke et al. (1987), Hungerford et al. (1988), and Marcinkowski et al. (1990). A UNESCO-UNEP (1990) summary of IEEP saw programs for the professional development of environmentally-educated teachers as the priority of priorities. They are now dated. Oulton and Scott (1995) have provided a recent analysis of problems associated with the UNESCO-UNEP approach.

The Queensland Board for Teacher Registration

The work of the Queensland Board for Teacher Registration (QBTR 1993) is also noteworthy as its working party qualified, refined and extended the UNESCO-UNEP ideas away from IEEP's dominant ecological perspective, re-classifying them as competencies in environmental studies, and competencies in environmental education. The Australian initiative *Teaching for a Sustainable World*, as reported by Fien (1995) and reviewed by Springett (1996) added to this work. Although the outcomes of the QBTR report improved on the IEEP recommendations, a number of issues still needed to be addressed. Tilbury's point about the demands and pressures of pre-service courses still applied despite the suggestion of professionally focused core and environmental studies focused option programs (QBTR 1993). Oulton and Scott's (1995) criticisms of UNESCO-UNEP for the lack of realism about the extensive and comprehensive nature of the defined competencies, which render them daunting, unapproachable and unattainable, also remain. The QBTR proposals do, however, address the need for change within institutions providing pre-service courses. They also take it as axiomatic that the professional development of the environmentally educated teacher needs to be an integral part of pre-service courses, rather than apart from them, and that courses must therefore address affective and cognitive aspects of novice teacher development. Both of these ideas are echoed in the development of the argument which follows. Crucial elements which are missing from the QBTR paper include any over-arching and integrative statement of overall aim for the pre-service professional development of the environmentally educated teacher, or any principles which would guide the establishment and construction of courses including questions of organization, content and pedagogy. In other words there is a lack of appropriate theory which would guide how such courses might be implemented within pre-service programs. Attempts to address such questions continue to be made within individual institutions in those countries where pre-service courses are sufficiently developed to allow this. Tilbury (1992, 1993), and Oulton and Scott, (1995) have from different

perspectives explored issues which inhibit the development of environmental education initiatives within pre-service teacher education courses, and which need to be resolved if progress is to be made. In addition to institutional approaches, there have been attempts to address collectively environmental education issues within teacher education courses by co-operative programs across institutions; recent Australian developments in environmental and development education have been briefly alluded to above (Fien 1995).

The contributions of the EEITE and ENSI initiatives to the debate

One European initiative which has specifically examined issues surrounding the development of environmental education within pre-service teacher education has been the Environmental Education into Teacher Education in Europe (EEITE) program which was carried out under the auspices of the Association of Teacher Education in Europe with funding from the European Commission's Directorate General XI, and from individual institutions. This program involves work with teacher-educators in eleven European Union (EU) countries. Another is the OECD-funded ENSI project (Environment and Schools Initiative), which is a co-operative curriculum development program based in primary and secondary schools in a range of countries.

Issues arising from the EEITE initiative

In the paper by Oulton and Scott (1995) the development work in this area carried out by EEITE was briefly reviewed, and Brinkman and Scott (1994) have reported on the early stages of the initiative and on its more recent outcomes (Brinkman & Scott 1996). The work of this project has highlighted the development problems which accrue from the multi-faceted diversity found in teacher education programs.

The wide variation in the ways in which issues relating to environmental education are dealt with if at all in pre-service courses is now well established—for a twenty-year perspective see Selim (1972), Mishra et al. (1985), and Williams (1992). In a recent paper Scott (1994) has examined the diversity within pre-service courses across the EU which militate against environmental education being featured or incorporated readily with courses for novice teachers. Scott claims that there are a number of separate elements to such diversity, namely:

- the organization of initial teacher education
- its practice in terms of working with novice teachers and with schools
- the interpretation of environmental education found within courses
- the readiness and ability to incorporate environmental education within courses
- the opportunity to deliver environmental education goals through pre-service courses

Experience suggests that these would be inevitable outcomes of a range of factors which are to do with both environmental education and initial teacher education. Such factors would include:

Initial teacher education	Environmental education
• the nature and extent of pre-service provision	• its significance within any agreed (national) school curriculum
• the number of alternative pathways to qualified teacher status (QTS), and	• any consensus about its national importance
• the roles universities and schools have in these	• the degree of convergence of view about desired goals for environmental education
• national frameworks and arrangements for course scrutiny and approval	• the interest and awareness levels of course managers and lecturers and their skills and competencies in this area
• the influence of school curricula on initial teacher education courses	• links between NGOs and initial teacher education lecturers and courses
• the freedom lecturers have in delivering curricula	• national policies about pre-service and imperatives towards environmental education

The origins and causes of diversity were conceptualized by the EEITE project as having multiple origins, causes and drives, and also as being multi-layered. The layers discussed by Scott (1994) in the context of environmental education developments within individual EU member states included national and institutional differences as had been reported by Tilbury (1992). A further three layers related to courses, tutors and schools. To these five elements of diversity a sixth (Scott 1994) relating to individual novice teachers themselves must be added because

the awareness, motivation and disposition of the individual student will determine the extent to which any opportunities which are provided can be taken up.

In summary, six layers of diversity are proposed:

Layer 1	<i>National circumstance</i>
Layer 2	<i>Institutions offering pre-service courses</i>
Layer 3	<i>Courses, management and course team</i>
Layer 4	<i>University lecturer</i>
Layer 5	<i>Schools</i>
Layer 6	<i>Individual novice teachers</i>

Furthermore owing to novice teachers varied experiences in schools and of out-of-school activities, it is probably true that they will show diversity of:

- educational background in which coherent experience of environmental education cannot be guaranteed because of the lack of consistent provision within schools and particularly within universities
- awareness and understanding of issues relating to environmental education, and a similar diversity of empathy towards its wider development, because of variation of their own experience and inclination towards environmental issues

There is also likely to be diversity in novice teachers'

- perception of the nature of curriculum
- view of the importance of incorporating environmental education within school curricula
- understanding of the range of ways in which they might make a personal contribution to environmental education through their own work with young people in schools and communities
- ability and readiness to see their own curriculum speciality as a vehicle for environmental education
- personal commitment to being involved through their own learning/teaching work with young people

It follows from this that any pre-service provision not only has to deal with a multiplicity of issues with both cognitive and affective dimensions but also is likely to have to begin from a varied base of experience and commitment. The vision of the virtuous developmental cycle whereby environmental-educated graduates prepare to become teachers who in their turn contribute to environmental education in schools is far from being realized. Any implementation theories which are developed need to be grounded in the complexities of such diversity.

Issues arising from the ENSI initiative

Recent papers by Posch (1995) and by Elliott (1995) which discussed the work of the OECD-funded ENSI program challenged orthodox ways of thinking about environmental education and schooling. In particular Posch outlined a number of problems associated with current educational practice, discussed major challenges schools face today and implications that these problems have for changes in curricula and teachers roles, and set out some framework conditions which might assist schools in preparing for such changes.

Posch suggested that circumstances in schools were not always fully propitious for such approaches to teaching and learning, but noted that many developments took place locally despite unsympathetic structural framework conditions determining mainstream education. His paper ended by outlining seven features that he considered could be found in current developments in schooling and which were likely to facilitate the development of a dynamic

culture of teaching and learning. These, which Posch stressed were marginal and unevenly spread, may be summarized as:

- teachers have time slots available for negotiated activities with their students
- longer time scales are available for curricula to be enacted, thus allowing local variation and co-operation
- subjects are redefined and broadened
- aims are prioritised rather than contents prescribed
- exemplar scenarios of instruction are provided to stimulate teacher experimentation
- teachers become more involved in the development of curricula so that the process has more priority than the eventual product
- curriculum development is viewed as systemic reform and new forms of assessment which are more in line with dynamic elements of the culture of learning are developed so that they integrate with and are complementary to curriculum development

Because of its careful and systematic exploration of environmental education issues in schools the ENSI program has significant implications for environmental education within pre-service courses. The central questions here are about how ENSI can help us think through with greater clarity what it is that pre-service courses might set out to do and what sort of theoretical framework might therefore inform their operation. It was from this background that the question emerged which initiated this research: "What characteristics would pre-service programs need to have in order that novice teachers could be prepared to work according to ENSI's aims, principle and learning theory?"

The research

The attempt to answer this question, drawing on both ENSI's work and that of EEITE, resulted in the generation of a tentative implementation theory which informs environmental education within pre-service programs. Specifically this theory addresses in detail:

- the desired outcomes of pre-service teachers' education courses in terms of novice teachers' professional skills and their understanding of environmental education
- the need for a double agenda of a set of goals determining tutors' work with novice teachers and a further set of related yet distinctive goals determining novice teachers' own work with students
- necessary approaches to teaching and learning within the course in order to realise such outcomes
- modes of course organisation required to facilitate such professional development, including links with schools and community organizations

By drawing on two initiatives which between them embrace environmental education in the context of both

school and teacher education, this research embodies a synthesis which is grounded in the realities of both the process of teacher education and of students' learning in schools. It also acknowledges that the development needs of the novice teacher themselves are inextricably bound up with their need to develop professionally through addressing the needs of the learner in school; that is, they need not only to be environmentally educated themselves, but also for this to have been achieved in such a way as to render them professionally capable of environmentally educating others. The tentative implementation theory expressed through this research is as Meyer (1995) maintains essentially a "set of values, both educational and environmental..." which Elliott (1995) sees as establishing a "criterial framework of process aims and values..." which will guide rather than determine both staff and curriculum development.

The research explicitly examined how ENSI's aims and guiding principles and EEITE'S organizing principles, key elements and program characteristics could be taken together and a tentative implementation theory established. This theory, it is argued, constitutes an criterial framework of process skills and values for the inclusion of environmental education within pre-service teacher education programs.

The research process

The development of the implementation theory was carried out through an iterative process which used the ideas of ENSI and EEITE in order to answer a series of research questions. This approach was based on the established process of deliberative inquiry. For an exploration of this approach see Dillon (1994) and Reid (1992). The fourteen questions which were asked are set out in Table 1 in the order in which they were posed. The response to each question represented a re-working of a statement of aim or a theoretical position arising from the original ENSI statements. The exact nature of each question to be posed was not pre-determined but emerged as part of the deliberation of the inquiry process. At each stage the revised form of word was formally written down. These iterations of the emerging theory, together with a full and step-wise discussion of the arguments employed, are set out elsewhere (Scott 1996).

Table 1: The research process

Step 1	The research question is posed: "what characteristics would pre-service programs need to have in order that novice teachers could be prepared to work according to ENSI's aims, principles and learning theory?"
Step 2	Seeing novice teachers as facilitators of student learning the ENSI aims are re-worked.
Step 3	Noting the development needs of novice teachers, and seeing the desirability of novices learning alongside teachers and students by collaborative working within the school and its community these aims are developed.

Table 1 (continued): The research process

Step 4	Acknowledging that the main thrust of work with novice teachers on pre-service programs has to be on pedagogy and on their development of professional awareness, understanding and competence the aim statement is extended.
Step 5	Recognising the need for novice teachers to work with students and others in schools and their communities the aim statement is elaborated.
Step 6	Given novice teachers' need to engage with professional issues through the development of their curricular work with students and that the focus here has to be on co-operative professional and curriculum development, ENSI's first guiding principle is restated.
Step 7	Accepting novice teachers' need to be able to use the locality as a source of learning for their students and themselves, such that their learning is focused on the development of pedagogical skills, and the need for novices to collaborate in order to pool expertise and effort and to work together, the second guiding principle is restated.
Step 8	Believing that novices have the dual need to learn themselves and to develop their own pedagogical skills whilst supporting and facilitating student learning, and recognising that it is important that managers, teachers, novice teachers, students and others work co-operatively together to create opportunities to work with and for the community, the third guiding principle is restated.
Step 9	Considering that novices need to be able to develop pedagogical skills which allow environmental experience to become the stimulus for, and focus of, work with students which embodies action-taking through and for the environment, the fourth guiding principle is restated.
Step 10	The statements of aims and guiding principles are brought together
Step 11	Because of the stress on the double agenda of novices' own learning and pupils' learning which is now found in both sets of statements, they are brought together.
Step 12	EEITE's organizing principles are now considered and incorporated to produce an initial statement of theory.
Step 13	EEITE's two key elements are then considered and incorporated.
Step 14	EEITE's program characteristics are then considered allowing the tentative implementation theory to be completed.

The six inputs to the inquiry process are shown in Table 2. These were statements taken from the outputs of both ENSI and EEITE initiatives. They are set out in the table in the order in which they were considered in the deliberative inquiry process.

Table 2: The inputs of data into the research

<p>INPUT 1. The ENSI projects two basic aims:</p> <ul style="list-style-type: none"> to help (school) students develop an understanding of the complex relationships between human beings and their environment through interdisciplinary enquiry; to foster a learning process which requires (school) students to develop dynamic instead of static qualities; such as exercising initiative, accepting responsibility, taking action to resolve real environmental problems within their locality. <p>INPUT 2. The ENSI project's four guiding principles:</p> <ul style="list-style-type: none"> students should experience the environment as a sphere of personal experience, that is, by identifying problems and issues within their local environment; students should examine their environment as a subject of interdisciplinary learning and research; students should have opportunities to shape the environment as a sphere of socially important action; students should experience the environment as a challenge for initiative, independence and responsible decision-making. <p>INPUT 3. The ENSI theory of learning is one in which:</p> <ul style="list-style-type: none"> the development of environmental awareness and understanding occurs through an active engagement in finding and implementing solutions to real-life problem that fall within the sphere of student's personal experience; environmental understanding is presumed to develop via a process of systematically reflecting about its application in practice. Learning on the environment is thus viewed as a form of action research. <p>INPUT 4. EEITE organizing principle:</p> <ul style="list-style-type: none"> the broad purpose of a pre-service teacher education course is that novice teachers should become both willing and able to make a contribution to environmental education through their own work with learners; willing in a sense that they understand the importance of environmental education and have a personal commitment to it which is both practical and intellectual; able in a sense that they have a repertoire of management of change and curriculum innovation strategies upon

Table 2 (continued): The inputs of data into the research

INPUT 5. EEITE argued that it is necessary for pre-service courses to contain two elements:

a consideration of the aims and practice of environmental education particularly as they relate to compulsory schools, an examination of curriculum practice and extra-curriculum opportunities and the desired learning outcomes associated with these, the identification of these characteristics which mark out curriculum activity as contributing to environmental education and an exploration of particular strategies and approaches which can be employed in environmental education;

practice in environmental education, working with teachers and children in schools on suitably small-scale activity, evaluating this practice and building on foundations laid through reflection and systematic planning, and in particular, evaluating the effects of this practice on the awareness of the possibilities and priorities of environmental education which they and learners develop.

INPUT 6. EEITE developed a number of program characteristics for environmental education within pre-service courses:

a local focus drawing from and contributing to expertise and awareness in the local community and involving action-taking in the local environment;

integration into initial teacher education courses rather than being an addition;

a clear set of aims and desired learning outcomes which are related to the goals of the pre-service course of the institution involved;

action-oriented in that novice teachers will be involved in planning, implementation and evaluation, and will be encouraged to have an individual commitment to reflection so as to build the experience into their own professional development;

the explicit development of concepts, attitudes and values relating to environmental education to be a key feature;

processes and outcomes of the project which can be shared by others;

the adoption of an holistic approach where possible;

a dual focus in which tutors and teachers work with novice teachers who, for their part work, with students in school;

reflection on local, national and global aspects of environmental issues;

a contribution to better citizenship through novice teachers being more informed and more active participants in democratic society;

a contribution to professional growth and development of novices as teachers and as reflective practitioners.

In order to follow the arguments, these two tables need to be looked at together. The tentative implementation theory which emerged is set out in Table 3.

Table 3: The implementation theory

A necessary outcome of all pre-service teacher education course is that novice teachers should be both willing and able to make a contribution to environmental education through their own work with learners; willing in a sense that they understand the importance of environmental education and have a personal commitment to it which is both practical and intellectual; able in a sense that they have an appropriate repertoire of suitable pedagogical approaches and management of change and curriculum innovation strategies upon which they can draw both individually and collaboratively

In order to achieve this end pre-service courses need to adopt teaching and learning processes involving researched cycles of practice, investigation, 'systematic evaluation', 'reflection' and 'planning' with others in the school and its community.

This will assist students to develop their own understanding of the:

- aims and practice of environmental education, both locally and globally
- desired learning and other outcomes associated with environmental education, particularly, but not exclusively, related to the work of schools
- criteria which identify curricular and extra-curricular activity which can contribute to environmental education goals
- ways in which they might most appropriately contribute to environmental education in schools given their own backgrounds and interests

It will also help them develop a command of the pedagogical and organizational skills necessary for the building of learning environments which emphasise:

- interdisciplinary approaches which result in students' understanding of the complex relationships between people and their environments
- the centrality of values and attitudes which reflect the goals of environmental education, particularly the need for individuals and groups to confront and appraise their current stances
- dynamic ways of working with students so that they develop personal qualities, such as exercising initiative, accepting responsibility and taking action, appropriate to their being able to take co-operative action to address real environmental problems
- students' first-hand, active experiences in their locality which result in their being able to identify problems and issues for exploration, to research or otherwise investigate such topics, to act co-operatively with others and to take action to address those problems and issues

Table 3 (continued): The implementation theory

All teachers irrespective of any phase or academic specialism have a role to play in working together to further the goals of environmental education and, therefore:

- all novice teachers' pre-service professional development should contain elements which allows the development of appropriate awareness, understanding, commitment and pedagogical and organisational skills
- these elements need to be integrated within initial teacher education courses in interdisciplinary and other ways which are synergistic with the aims of the pre-service courses
- within an agreed set of overall aims, pre-service courses have a double agenda of a set of goals determining tutors' work with novice teachers, and a further set of related yet distinctive goals determining novice teachers' own work with students
- each of these agenda is realized through an active collaboration between tutors and novices with students, teachers and community representatives by means of researching, finding and implementing solutions to real-life problems that fall within the sphere of novice teachers' and students' experiences of working in schools and their communities
- novice teachers' pedagogical and organizational skills relating to environmental education develop by means of a process of systematic reflection about its purposes and its application in practice; becoming a practising, environmentally educated and environmentally educating teacher is thus a process of researched action

by tutors in their work with novice teachers and by novice teachers in their work in and around schools, including issues relating to the role and importance of systematic or abstract knowledge identified within the original aims of the ENSI project. The work of QBTR (1993) is relevant here but also needs to be re-developed

Because this implementation theory has been generated by the iterative process of deliberative inquiry it is incomplete and tentative and is open to critique and refinement. The purpose of generating the theory has been to stimulate and open up such a process.



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A concluding comment

Tilbury (1992) ended her paper by calling for a realistic model for environmental education within pre-service courses. She stipulated that the model would need to be grounded in the intricacies of teacher education institutions, to which we might now add the complexities of the role of the teacher in the process of change for the emerging school curriculum, and the urgencies of the professional development of the novice teacher.

Tilbury went on to suggest that such a realistic model had to be accompanied by sound strategies which would ensure its development. It is clear that such strategies will need to focus on several issues. These include:

- the management of change within teacher education institutions in order to develop our understanding of how such criterial frameworks can best be established and nurtured. Some steps have already been made on this road by for example Bullock et al. (1996), but the development of ideas presented here will mean that such ideas might now be reviewed and reconceptualized
- the nature of competencies which need to be developed

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