LEARNING FOR A SUSTAINABLE ENVIRONMENT:
An Agenda for Teacher Education in Asia and the Pacific

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# CONTENTS

<table>
<thead>
<tr>
<th>Acknowledgments</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter One</td>
<td>1</td>
</tr>
<tr>
<td>: Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Chapter Two</td>
<td>7</td>
</tr>
<tr>
<td>: Learning for a sustainable environment</td>
<td>7</td>
</tr>
<tr>
<td>Chapter Three</td>
<td>26</td>
</tr>
<tr>
<td>: Environmental education in the Asia-Pacific Region</td>
<td>26</td>
</tr>
<tr>
<td>Chapter Four</td>
<td>33</td>
</tr>
<tr>
<td>: Environmental education in teacher education: the priority of priorities</td>
<td>33</td>
</tr>
<tr>
<td>Chapter Five</td>
<td>42</td>
</tr>
<tr>
<td>: A competency based framework for teacher education in environmental education</td>
<td>42</td>
</tr>
<tr>
<td>Chapter Six</td>
<td>67</td>
</tr>
<tr>
<td>: Learning for a sustainable environment innovations in teacher education through environmental education</td>
<td>67</td>
</tr>
<tr>
<td>References</td>
<td>74</td>
</tr>
<tr>
<td>Appendix</td>
<td>80</td>
</tr>
<tr>
<td>: Competencies of the environmentally educated teacher</td>
<td>80</td>
</tr>
</tbody>
</table>
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Many colleagues in environmental education from the countries of Asia and the Pacific have contributed to the development of the ideas we have expressed in this monograph.

A UNESCO Asia-Pacific Regional Experts’ Meeting on “Overcoming the Barriers to Environmental Education through Teacher Education” which was held at Griffith University, Australia in July 1993, was a turning point for both of us in the development of our ideas on the role of environmental education in contributing to sustainable development. Although the competencies which we present in this monograph were the end-product of a three-year research project into practices and possibilities in environmental education at the teacher education level, it was our discussions at this meeting with regional experts from 15 countries which helped refine our ideas on strategies for developing environmental education competencies.

Two subsequent UNESCO-sponsored meetings on environmental education and teacher education in the Asia-Pacific region during 1993 were also influential. These were the UNESCO-ACEID conference on “Environmental Education and Teacher Education in Asia and the Pacific” at the National Institute for Educational Research (NIER) in Tokyo, and a SEAMEO-UNESCO Sub-regional conference on “Environmental Education and Secondary Teacher Education” which was held in Penang, Malaysia. These meetings laid the foundation of the UNESCO-ACED project on “Learning for a Sustainable Environment Innovations in Teacher Education,” which is sponsored by UNESCO-ACEID, the Australian government and Griffith University. This monograph is the result of an early planning meeting for this project. The meeting recommended that a detailed position paper be prepared to provide a rationale and set of operating procedures to facilitate the adoption of environmental education as a priority in teacher education in the Asia-Pacific region.

We would like to express our thanks to the delegates to all these meetings for their help in the development of our ideas. The ideas and the words are ours - but we could not have written them without you.
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Chapter One

INTRODUCTION

The crisis of sustainability, the fit between humanity and its habitat, is manifest in varying ways and degrees everywhere on earth. It is not only a permanent feature on the public agenda; for all practical purposes it is the agenda. No other issue of politics, economics and public policy will remain unaffected by the crisis of resources, population, climate change, species extinction, acid rain, deforestation, ozone depletion, and soil loss. Sustainability is about the terms and conditions of human survival, and yet we still educate at all levels as if such crisis existed. The content of our curriculum and the process of education, with a few notable exceptions, has not changed.

Those presuming to educate should not stand aloof from the decisions about how and whether life will be lived in the twenty-first century. To do so would be to miss the Mount Everest issues on the historical topography of our age, and condemn ourselves to irrelevance (Orr 1992, pp. 83, 145).

This book seeks to provide guidance to teacher education institutions in Asia and the Pacific on ways in which teachers may be prepared to meet the challenges of teaching and learning for a sustainable environment.

Environmental education could be seen as just another of a number of pressures on already over-crowded teacher education programmes. As with schools and teachers, teacher educators are often called upon to help assuage society’s problems. This is to be expected given the government funds allocated to education and the desire for schooling to be relevant to social questions, issues and problems. Thus, there are demands that education be vocationally relevant promote intercultural appreciation and harmony, develop personal and interpersonal skills, encourage active and informed citizenship, and so on. Hazlett (1979) has described the policy process through which governments “reduce political, social, and economic problems to educational ones and . . . expect schools to cure present ills and provide for a brighter tomorrow for individuals and the collectivity” (p. 133).
Multi-cultural education, school-industry links, consumer education, drug education, HIV/AIDS education and so on are examples of numerous curriculum responses to this process. There is some debate about the ethics and motivations of this process and about the style of decision making often involved. However, there can be little dispute over the fact that such ‘educational problems’ and associated curriculum developments in schools place additional demands on teachers and teacher education programmes.

However, environmental education is more than just another such ‘educational problem’ requiring a response in teacher education. As was noted in the opening quotation, “the crisis of sustainability is not only a permanent feature on the public agenda, for all practical purposes it is the agenda” (Orr 1992, p. 83). No other issue facing the world today is of such pervasive and long-term significance as the need to find ways of living within the resource limits of the planet and our social systems.

This has been recognized by many people from all walks of life and is manifested in the rising levels of public awareness of environmental problems and growing public concern over the stability of ecosystems and the sustainability of present patterns of development. Many schools and colleges in the Asia-Pacific region have been motivated by student, parent and teacher interest in this issue of sustainability to incorporate environmental education into their schools, and have developed a range of innovative programmes and activities. They have been supported by the policy processes within education systems and the provision of guidelines, resources, and opportunities for professional development. Teacher educators, especially in science, social studies and geography curriculum studies courses, have responded in a number of ways to the growing need for professional development in environmental education also.

However, despite the rising interest in environmental education in schools and the expectations of governments that environmental education will play a role in maintaining the sustainability of ecosystems, several evaluation studies of environmental education indicate cause for concern. These studies which are detailed later indicate that good practice in environmental education is not widespread as education systems and policies would like and that, even with the best of intentions, many schools and teachers have difficulty implementing the full range of objectives and strategies for environmental education. One of the explanations for this is the very low percentage of teachers who have received either pre-service studies or undertaken in-service professional development in environmental education.

These concerns make it timely that comprehensive attention be given to the place of environmental education in pre-service and in-service teacher education.
Introduction

programmes. This monograph has been prepared to provide a focus for discussion of environmental education issues in teacher education. Outcomes from such discussions could include

- An increase and widening of interest in environmental education across the range of disciplines in teacher education;
- A sharing of expertise, debate and research in environmental education across teacher education institutions in the Asia-Pacific region;
- An identification of the competencies required of the environmentally educated teacher;
- A review of existing provision for environmental education in teacher education programmes; and
- Comprehensive approach to preparing teachers for the challenges and responsibilities they face in environmental education in schools and colleges.

The audience of this report includes those involved in both initial pre-service and continuing in-service teacher education. Much of the focus, however, is on pre-service teacher education because of the need to address the importance of environmental education in teachers’ work right from the beginning of their professional socialization and training. However, the themes we address are relevant to the in-service professional development of teachers also. As well as teacher education institutions, professional associations, education systems and schools are invited to consider these implications for their initiatives in the fields of curriculum development, staff development, short courses, higher degree studies, and research in environmental education.

Overview

The chapters in this book have been organized to address three major themes: the nature, purposes and scope of environmental education, Asia-Pacific initiatives in this area, and recommendations for the promotion of environmental education in teacher education. The first theme is developed in Chapter Two which provides a background to the roles that international reports have prescribed for environmental education. The argument is developed in two parts. First, the development of environmental education is examined within the contexts of environmental problems and the importance of sustainable development. Second, the nature, objectives and guiding principles of environmental education are outlined. The reports of the
UNESCO-UNEP International Environmental Education Programme are used as a basis for this. This section also explains a three-fold approach to environmental education which integrates education in the environment, education about the environment and education for the environment. Education for the environment is shown to adhere most closely to the principles of education for a sustainable environment but that education in and about the environment are essential underpinnings for this. The chapter concludes with a review of a number of central concepts and key ideas for environmental education and a description of the general patterns of learner-centred and issues-based pedagogy that are most appropriate to the objectives and guiding principles of environmental education.

Chapter Three provides a background to the present state of environmental education in the Asia-Pacific region. Of course, a comprehensive regional survey is not possible within the small space of one chapter. Instead, an overview is provided and a range of innovations in environmental education is sampled from countries across the region in order to show how governments, schools, teachers and students are seeking to achieve the objectives of environmental education. The examples are taken from the Country Reports presented to the 1993 UNESCO-ACEID conference on “Environmental Education and Teacher Education in Asia and the Pacific” hosted by the Japanese National Institute for Educational Research (NIER 1993).

Chapters Four, Five and Six focus on the third theme – the need for environmentally educated teachers and the ways in which this need may be met and enhanced through teacher education.

A rationale for focusing on teacher education in achieving this goal is provided in Chapter Four which draws upon reports of UNESCO-UNEP International Environmental Education Programme and evidence from all regions of the world, including the Asia-Pacific region, that the rhetoric advancing the importance of teacher education is not reflected in either the pre-service or in-service training of teachers. An argument is made that this is a particularly acute problem in the training of generalist primary school teachers who have special responsibilities for environmental education due to the receptive attitudes of primary school children to the messages of environmental education and the importance of environmental education in basic general education.

Chapter Five proposes a competency-based model of teacher education for environmental education. Three concepts of “competency” are examined and an argument put forward that competency-based programmes based upon generic and cognitive concepts of competency are in accord with the principles of education for a sustainable environment as they avoid the mechanistic and reductionist aspects of the
behaviorist approach to competencies. Two sets of competencies which could form the basis of action in teacher education programmes are identified. These are: (1) the competencies of the environmentally educated person, and (2) the professional competencies of the environmental educator. These competencies are detailed in Chapter Five. This chapter stresses that it is not intended that every competency which is listed should appear in a teacher education programme. Rather, it is intended, for example, that the list of competencies be used as a mirror to review existing programmes in order to identify where important changes may be made if it is believed that environmental education competencies are not being addressed adequately. Similarly, the competencies may be used as a checklist against which experienced teachers may examine their needs for on-going professional development.

An appendix provides a listing of themes and sources which may be used as the basis for programme and course planning to infuse these environmental education competencies into pre-service teacher education courses and in-service education activities.

Finally, the chapter explores a number of issues related to these competencies which need to be considered by teacher education institutions and authorities when developing a framework for including environmental education in their programmes. These issues are of two general types: (1) programme planning issues to ensure that all students and teachers receive appropriate opportunities to develop competencies in both environmental studies and environmental education, and (2) issues related to the pedagogical and professional development approaches adopted for developing these competencies. Attention to these issues, especially the latter, is essential for the approach to competency-based teacher education being developed emphasizes the generic notion of competency rather than the mechanical skills of behavioristic competencies.

Chapter Six provides an introduction to an important UNESCO-ACEID project which is seeking to give effect to the recommendations in this book. The project is called Learning for a Sustainable Environment: Innovations in Teacher Education through Environmental Education. The project has arisen as a direct outcome of three UNESCO and ACEID sponsored meetings on environmental education which were held in the Asia-Pacific region during 1993. The project particularly focuses upon the professional competencies of the environmental educator (Set II) with the competencies of the environmentally educated person (Set I) being developed at a later stage. This is because the delegates to these three meetings identified a particular need in the region to support teacher educators and teacher education programmes in the areas of curriculum planning and pedagogical approaches so that their graduates might be better able to achieve the objectives of
Learning for a sustainable environment

environmental education with their own classes. This, in effect, was a call for a professional development programme for teacher educators.

The principles of professional development outlined at the end of Chapter Five have informed the development of this project. The primary goal of the project is to assist teacher educators in the Asia-Pacific region to include the educational purposes and innovative teaching and learning strategies of environmental education in their programmes. The project seeks to provide professional development opportunities for teacher educators at the pre-service and in-service education levels by engaging them in a process of sharing and further developing the innovative approaches and materials they are using to promote environmental education in their various teacher education activities. The project is intended to serve as a stimulus for professional development and innovation in teacher education through this process of curriculum/resource development, critical reflection and the sharing of materials to support innovative approaches.

Thus, the project seeks to create a spiral network of innovative teacher education practices and practitioners in environmental education. This will be achieved by providing teacher educators with prototype materials that have been found useful in one country, and which have then been made available to colleagues and institutions in other parts of the region for review, adaptation and trial. Participants in this process will be encouraged to write case studies of their experiences and to share them (and copies of their revised materials) with other teacher educators in the region. The purpose of this professional development process for teacher educators is to assist them to incorporate into their programmes the knowledge and skills which can help teachers to introduce and improve environmental education in their classroom. It is hoped that the promotion of the innovative teaching strategies of environmental education may also improve the quality of learning in many other areas of the curriculum.
Chapter Two

LEARNING FOR A SUSTAINABLE ENVIRONMENT

The year 1990 marks the beginning of a decade of significant importance for environmentalists and environmental educators (UNESCO-UNEP 1989, p. 1).

The last decade has witnessed heightened public awareness of the scale, seventy and complexity of many environmental problems. Numerous reports indicate that public concern for the environment is at unprecedented levels throughout the world (e.g. Dunlap, Gallup and Gallup 1992). Concern has been growing since the early 1960s over problems as diverse, yet global in impact, as atmospheric warming and climatic change, the destruction of rainforests and threats to bio-diversity, accelerating rates of land degradation and desertification, population-resource imbalances, urban decay, industrial accidents, the disposal of wastes, and a range of other threats to the quality of human life and the sustainability of ecosystems. Acknowledging this concern, Time magazine chose to honour “Endangered Earth” instead of a Man or Woman of the Year in 1988. The lead story writer explained that

... worldwide public opinion . . . sensed that this gyrating globe, this precious repository of all the life that we know of, was in danger. No single individual, no event, no movement captured the imagination or dominated headlines more than the clump of rock and soil and water and air that is our home. Thus, in a rare but not unprecedented departure from its naming a Man (sic) of the Year, Time has designated Endangered Earth as the Planet of the Year for 1988 (Sanction 1989, pp. 11-12).

People in the 1990s are becoming increasingly aware that humankind is an important part of the environment. Instead of seeing the environment as just nature and natural systems, the environment is being recognized as the totality of our surroundings and existence which results from the way we use nature and its resources to satisfy our needs and wants. This means that the environment is a complex web of social, cultural, economic and political as well as gee- and biophysical components. There is also a growing realization that environmental problems cannot be understood without reference to social, economic and political values, and that managing the environmental crisis will depend upon changes in environmental values and lifestyle
Learning for a sustainable environment

choices. Thus, Schleicher (1989, p. 277-278) writes of the need for a new “ecological ethic, . . . an ecologically oriented value system” based upon “fundamental change(s) in human attitudes and actions towards ourselves and the environment”.

The scope of such a change in social values has been likened to a change in social paradigms or world views. This would involve a process of change towards social systems, institutions and practices guided by values such as: empathy with other species, other people and future generations, respect for natural and social limits to growth, support for careful planning in order to minimize threats to nature and the quality of life, and a desire for change in the way most societies conduct their economic and political affairs (see Milbrath 1989, pp. 58-87).

While there is debate about particular directions and the pace of this “paradigm shift” and about the effectiveness of different strategies for social change, there seems to be wide agreement, both in Australia and internationally, that education has an important role to play in motivating and empowering people to participate in environmental improvement and protection. Indeed, as early as two decades ago, education was described by one commentator as “the greatest resource” in this endeavour (Schumacher 1973, p. 64).

The importance of environmental education has been stressed in the four major international environmental reports of the last decade. The theme of these reports is the search for sustainable patterns of development and living that can redress present day environmental decline without jeopardizing the ecosystem or resource base for future generations.

The Brundtland Report of the World Commission on Environment and Development (1987) argued that “the world’s teachers . . . have a crucial role to play” in helping to bring about the “the extensive social changes” needed for sustainable development (p. xiv). The 1980 World Conservation Strategy was quite explicit about the role of education in bringing about such changes. It argued that

*Ultimately, the behaviour of entire societies towards the biosphere must be transformed if& achievement of conservation objectives is to be assured. A new ethic, embracing plants and animals as well as people, is required for human societies to live in harmony with the natural world on which they depend for survival and well-being. The long-term task of environmental education is to foster or reinforce attitudes and behaviors compatible with this new ethic (IUCN, UNEP and WWF 1980: Section 13).*
Learning for a sustainable environment

This message was repeated in Caring for the Earth: A Strategy for Sustainable Living which was prepared as the World Conservation Strategy for the 1990s (IUCN, UNEP and WWF 1991). Caring for the Earth argues that education has a vital role to play in ensuring that people learn, accept and live by the principle that “living sustainably depends on accepting a duty to seek harmony with other people and with nature” (p. 8):

Sustainable living must be the new pattern for all levels: individuals, communities, nations and the world. To adopt the new pattern will require a significant change in the attitudes and practices of many people. We will need to ensure that education programmes reflect the importance of an ethic for living sustainably (IUCN, UNEP and WWF 1991, p. 5).

Agenda 21 is the internationally agreed report of the United Nations Conference on Environment and Development or “Earth Summit” which was held in Rio de Janeiro in June 1992. Agenda 21 devotes a whole chapter to the role of environmental education in relation to sustainability:

Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues . . . . It is critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective public participation in decision-making (UNCED 1992, Chapter 36, p. 2).

The theme of ecologically sustainable development, which is central to all these calls for environmental education, is also central to the vision of a desirable society held by many people today. With such high expectations of education, it is important to explore what is meant by sustainable development and sustainability. Unfortunately, definitions of these concepts vary enormously (Fien 1993; Orr 1992). However, at the heart of these concepts is the hope that the impact humans have on the earth and the way we organize the flows, production and distribution of resources and wastes can be mitigated in both the short and the long-term. The idea of sustainability asks governments, communities and individuals to consider the needs of future generations in what political scientists define as the essential questions of public policy: “Who gets what, when, and how?” (Orr 1992, p. 145).

When sustainable development is included in visions of a desirable future, it is possible to identify a definition of sustainability – and a range of related issues – that
Learning for a sustainable environment

education should address if those visions are to be achieved. Such a definition of
sustainable development sees it as a process which requires that the use of
environments and resources by one group of people does not jeopardize the
environments and well-being of people in other parts of the world or destroy the
capacities of future generations to satisfy their reasonable needs and wants. In their
teaching pack, *Only One Earth*, Beddis and Johnson (1988) argue that a number of
issues and questions linking ecological sustainability and justice flow from such a
view. These include:

- There are great differences in the availability and use of resources
  around the world, with poverty and need in some areas matched by
  over-production and over-consumption in others.

  *How can the over-consumption, waste and misuse of resources by
  some people be reduced? How can the severe poverty that causes
  many to exploit the earth just to survive be eliminated? How can the
  pressure on the environment from both causes be overcome?*

- Some economic activities do great harm to environments, resources
  and communities.

  *How can economic activity be made of benefit to the communities and
  the companies involved, without critical damage to the environment?*

- Economic growth in some parts of the world is so high that it is
  leading to the production and consumption of many items that are
  super-luxuries and use resources that could be used to satisfy the needs
  of many of the world’s poor.

  *How can the resources consumed by such luxuries be redirected to aid
  the poor or be conserved for future generations?*

- Relatively high population densities and growth rates in certain parts
  of the world, and the associated pressure on the local resource base, are
  symptoms of the legacy of colonialism and present-day structural
  inequalities in the world economic system. Appropriate social
development lies at the heart of the solution to population and
environmental pressures.

  *How can the nexus between the environment, social development and
  population growth be formulated to ensure the sustainable use of
  resources?*
Learning for a sustainable environment

- The indigenous and farming peoples of many countries have developed an ethic of sustainability and associated land use practices that have preserved their culture and harmony between people and nature for millennia.

  *How can the rights of these people be maintained and the knowledge and wisdom they possess be shared with others in all parts of the world?*

- Women and young people have a vital role to play in environmental care and development, now and into the future. They have viewpoints, skills and interests that can help maximize the potential for sustainable development.

  *How can the wisdom, courage and talents of women and young people be used as a model for sustainable development policies and practices?*

- The most effective arena for action on sustainability and justice issues is the local community.

  *How can people best organize themselves locally – and liaise with others nationally and globally – to collaborate in the movement towards sustainable development?*

*(Beddis and Johnson 1988)*

These are issues that educationalists have been slow to address. In concentrating on addressing issues of class and economic reproduction and the reproduction of racial and gender inequalities, educationalists have been slow to analyze the relationship between education and the processes of the world economy, the nature of the dominant model of what counts as economic development, and the environmental destruction upon which it is based. D’Urso (1990) has described the environmental crisis and educational responses to it as “curiously neglected by socio-cultural theorists of education” and urges them to strike “beyond the bounds of current educational concerns” to establish environmental education as “a new and vitally important discourse” (p. 92).

Only recently has this analysis been extended to consider the relationship between education and the reproduction of environmental values and the practices of global capital. For example, Trainer (1990) has argued that both the overt and the hidden curricula of schools play a major role in reproducing the ecologically
unsustainable values of “industrial, affluent, consumer society” (p. 105), including those which support the desirability of unfettered economic growth, the importance of self-advancement, and the wisdom of allowing the profit motive and the market to determine economic and social priorities (p. 107). In addition, Berberet (1989) has noted that, while the environment has been only “a minimal factor in mainstream educational thinking” (p. 3), education has played a key role in perpetuating unsustainable environmental practices:

Historically, the values of schools and colleges have mirrored those of the larger society. Not only has education uncritically accepted the association of progress and the unfettered growth economy, it has trained the engineers and managers, performed the research, and developed the technologies which in aggregate have had such a devastating impact on the environment. A fundamental reorientation now needs to occur with the development of new assumptions undergirding education which treat the interactions of ecological processes, market forces, cultural values, equitable decision-making, government actions, and environmental impacts of human activities in a holistic, interdependent manner (pp. 4-5).

These are serious claims which need to be considered and tested and, if they are found to be valid, warrant urgent attention at all levels of education, including teacher education. Issues of environment, social justice and sustainable development do pose important questions for the future of human society. They are also important for those who wish to teach for a just and sustainable future and those who are involved in the education of such teachers. This means that those involved in environmental education, at whatever level, need to recognize its socially critical or reconstructionist orientation and promote approaches to curriculum planning and pedagogy that can help integrate issues of sustainability into a vision and a mission of personal and social change.

However, not all approaches to environmental education emphasize these issues and the social changes needed for a sustainable environment. Indeed, there is sometimes disagreement over the relative importance of different knowledge, skill and affective objectives and the social and political interests served by different approaches to environmental education (Robottom 1987a). Nevertheless, there is growing consensus in United Nations reports on environmental education, the environmental education literature, and the policies and curriculum guidelines developed by education systems throughout the Asia-Pacific region that environmental education needs to address a wide range of knowledge, skill, values
Learning for a sustainable environment

and participation objectives in order to help students play an informed and active part, both now and later as adults, in the resolution of environmental questions, issues and problems and the creation of a fairer, less troubled, and more sustainable world in which to live.

What is environmental education?

The nature and goals of environmental education have been formulated through a number of international, national and state initiatives over the last two decades. The International Environmental Education Programme, which is jointly sponsored by UNESCO and UNEP (United Nations Environment programmes), has taken the lead in these initiatives. Thus, among the most authoritative statements on environmental education are those recommended and endorsed at the 1977 Intergovernmental Conference on Environmental Education held in Tbilisi (UNESCO-UNEP 1978) and subsequently re-endorsed at the International Congress on Environmental Education and Training in Moscow in 1987 (UNESCO-UNEP 1988). These statements have been used as the basis for policy development in environmental education in many countries in the Asia-Pacific region.

The Tbilisi Declaration provides a general set of goals, objectives and principles for environmental education which have been used in many parts of the world as the starting point for the development of local and national environmental education policies. The goals and objectives agreed for environmental education in the Tbilisi Declaration are:

Goals

1. To foster clear awareness of, and concern about, economic, social, political and economic interdependence in urban and rural areas;

2. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and

3. To create new patterns of behaviour of individuals, groups and society as a whole towards the environment (after UNESCO-UNEP 1978, p. 3).
Learning for a sustainable environment

Objectives

1. Awareness To help students acquire an awareness of, and sensitivity to, the total environment and its allied problems.

2. Knowledge To help students gain a variety of experiences within the total environment and develop a basic understanding of the total environment, its associated problems, and humanity’s critically responsible presence and role in it.

3. Attitudes To help students develop a set of values and feelings of concern for the environment and the motivation to participate actively in environmental improvement and protection.

4. Skills To help students acquire the skills for identifying, investigating and solving environmental problems.

5. Participation To provide students with the understandings, skills and self-esteem, as well as opportunities, to be actively involved at all levels in working toward the resolution of environmental problems (after UNESCO-UNEP 1978, p. 3).

The guiding principles agreed for programmes in environmental education based upon these goals and objectives emphasize that environmental education should:

- Consider the environment in its totality – natural and built, technological and social (economic, political, cultural-historical, moral, aesthetic);

- Be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages;

- Be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;

- Examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in different geographical conditions;
Learning for a sustainable environment

- Focus on current and potential environmental situations while taking into account the historical perspective;
- Promote the value and necessity of local, national and international co-operation in the prevention and solution of environmental problems;
- Explicitly consider environmental aspects in plans for development and growth;
- Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- Relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age but with special emphasis on environmental sensitivity to the learner’s own community in early years;
- Help learners discover the symptoms and real causes of environmental problems;
- Emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills; and
- Utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience (UNESCO-UNEP 1978, p. 3).

A number of definitions of environmental education have been developed to reflect the goals, objectives and principles of the Tbilisi Declaration. Hungerford, Peyton and Wilke (1980) have described environmental education as a process for aiding people to become “environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, towards achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment” (p.43). Thus, environmental education might be defined as:

...an across the curriculum approach to learning that is useful to individuals and groups in coming to understand the environment with the ultimate objective of developing caring and committed attitudes that will foster the desire to act responsibly in the environment. Thus, environmental education is concerned about knowledge, and also feelings, attitudes, skills and social action (Fien 1988, p. 10).
Learning for a sustainable environment

Approaches to environmental education

Achieving these goals and objectives involves the integration of three approaches to environmental education which have commonly become known as education in the environment, education about the environment, and education for the environment.

Education in the environment

Experience in the environment – be it a city street or a farm, a rural village or an island beach, a park or a forest – can be used to give reality, relevance and practical experience to learning. Increased awareness of aspects of the environment can be expected from any opportunities for direct contact with the environment. Opportunities to learn out-of-doors can also be used to develop important skills for data gathering, such as observation, sketching, photography, interviewing, and using scientific instruments, and social skills such as group work, co-operation and aesthetic appreciation. Environmental awareness and concern can also be fostered by linking learning to direct experiences in the environment and allowing learners to become captivated by the complexity and wonder of natural systems or immersed in the values conflict over particular environmental issues. One commentator has summarized the central thrust of education in the environment as “education for environmental awareness and interpretation” as a result of these benefits (Huckle 1993).

Education about the environment

Awareness and feelings of concern for the environment are not enough, however, if living responsibly and sustainably in the environment is an educational goal. Concern needs to be translated into appropriate behaviour patterns and actions but, for this to happen in an informed and responsible way, it is necessary for learners to have a basic understanding of how natural systems work and the impact of human activities upon them. This will include learning about political, economic and socio-cultural factors, as well as about the ecological ones that influence decisions about how to responsibly use the environment. Knowledge about the environment is essential if all citizens are to participate in any informed debate aimed at resolving local, national and global environmental issues. As a result of these objectives, Huckle (1993) has described the central thrust of education about the environment as “education for environmental management”.

16
Education for the environment

Education for the environment aims to promote a willingness and ability to adopt lifestyles that are compatible with the wise use of environmental resources. In so doing, it builds on education in and about the environment to help develop an informed concern and sense of responsibility for the environment through the development of an environmental ethic and the motivation and skills necessary to participate in environmental improvement. The UNESCO-UNEP International Environmental Education Programme has stressed that environmental education needs to be based upon a search for answers to a number of critical questions if it is to achieve these important citizenship goals:

As decisions regarding the development of society and the lot of individuals are based upon considerations, usually implicit, concerning what is useful, good, beautiful, and so on, the educated individual should be in a position to ask such questions as: Who took this decision? According to what criteria? With what immediate ends in mind? Have long-term consequences been calculated? In short, he (sic) must know what choices have been made and what value-system determined them (UNESCO 1980, p. 27).

As a result of these objectives, Huckle (1993) has described the central thrust of education for the environment as “education for sustainability”.

Education for sustainability

It is possible to reflect upon the goals and objectives of environmental education in the Tbilisi Declaration of 1977 which were introduced in the previous section of this chapter in the light of recent thinking about sustainable development and education for sustainability. This was one of the tasks of the delegates at the UNESCO Asia-Pacific Regional Experts’ Meeting on “Overcoming the Barriers to Environmental Education through Teacher Education” which was held in July 1993. These delegates suggested that the goals of environmental education from the Tbilisi declaration could be rewritten to read as follows:

1. To foster clear awareness of, and concern about, economic, social, political and economic interdependence at local, regional, national and international/global levels;
Learning for a sustainable environment

2. To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; (and)

3. To develop and reinforce new patterns of environmentally sensitive behaviour among individuals, groups and society as a whole for a sustainable environment.

(adapted from UNESCO-UNEP 1978 p. 3; and UNESCO and Australian Association for Environmental Education 1993, p. 34)

The British Environment, Development, Education and Training Group’s report, Good Earth-Keeping: Education, Training and Awareness for a Sustainable Future has formulated a similar set of goals in the light of contemporary thinking on the role of environmental education in promoting a sustainable environment. The Group states that:

We believe that education for sustainability is a process which is relevant to all people, and that, like sustainable development itself, it is a process rather than a fixed goal. It may precede – and it will always accompany – the building of relationships between individuals, groups and their environment...

We argue here that education for sustainability is a process which:

◆ Enables people to understand the interdependence of all life on this planet, and the repercussions that their actions and decisions may have both now and in the future on resources, on the global community, as well as their local one, and on the total environment.

◆ Increases people’s awareness of the economic, political, social, cultural, technological and environmental forces which foster or impede sustainable development.

◆ Develops people’s awareness, competence, attitudes and values, enabling them to be effectively involved in sustainable development at local, national and international level, and helping them to work towards a more equitable and sustainable future. In particular, it enables people to integrate environmental and economic decision-making.
Learning for a sustainable environment

- Affirms the validity of the different approaches contributed by environmental education, and development education and the need for the further development and integration of the concepts of sustainability in these and other related cross-disciplinary educational approaches, as well as in established disciplines (Sterling/EDET Group 1992, p. 2).

The delegates at the UNESCO Asia-Pacific Regional Experts’ Meeting on “Overcoming the Barriers to Environmental Education through Teacher Education” used statements such as this to rewrite the objectives of environmental education in the Tbilisi Declaration to read as follows:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Awareness</td>
<td>To help social groups and individuals acquire an awareness and sensitivity to the total environment and issues, questions and problems related to environment and development.</td>
</tr>
<tr>
<td>2. Knowledge</td>
<td>To help individuals, groups and societies gain a variety of experience in, and acquire a basic understanding of what is required to create and maintain a sustainable environment.</td>
</tr>
<tr>
<td>3. Attitudes</td>
<td>To help individuals, groups and societies acquire a set of values and feelings of concern for the environment, and motivation for actively participating in environmental improvement and protection.</td>
</tr>
<tr>
<td>4. Skill</td>
<td>To help individuals, groups and societies acquire the skills for identifying, anticipating, preventing and solving environmental problems.</td>
</tr>
<tr>
<td>5. Participation</td>
<td>To provide individuals, groups and societies with an opportunity and the motivation to be actively involved at all levels in working toward creating a sustainable environment.</td>
</tr>
</tbody>
</table>

(adapted from UNESCO-UNEP 1978, p. 3; and UNESCO and Australian Association for Environmental Education 1993, p. 34)

Education for sustainability (or education for the environment) thus stands in contrast with education about and in the environment which, through their strong content and field experience orientations, address only a limited number of these objectives. In contrast with education about and in the environment, education for sustainability focuses on students working individually and in groups towards the
Learning for a sustainable environment

resolution of environmental questions, issues and problems. This involves many non-traditional approaches to teaching and learning, including what the World Commission on Environment and Development (1987) described as the active “involvement of students in the movement for a better environment” (p. 114).

However, all this does not mean that education about and in the environment are not very important. However, it does require them to be seen in context of the broader issues of education for sustainability. If the long-term goal of education is to promote sustainable and socially just lifestyle choices, then education in and about the environment are valuable because they can provide the skills and knowledge which support education for sustainability. The integration of these three approaches to environmental education means that it is aimed at educating citizens who are knowledgeable about the natural and social environment, skilled in researching environmental issues, aware of how to help resolve these issues, and motivated to work towards a better environment for all. Co-ordinating the contributions of the many subject areas that can contribute to these objectives requires a whole school planning approach to environmental education. This can be achieved by focusing planning around a core of central concepts and pupil-centred pedagogical approaches.

Key concepts for environmental education

There have been a number of attempts to identify key concepts for environmental education (e.g. Hungerford, Peyton and Wilke 1980; Huckle 1988; Meadows 1989). Four concepts that are common to these listings and which reflect the integration of education in the environment, about the environment and for the environment are: interdependence, sustainable resource management, sustainable values and lifestyle choices, and civic participation.

1. Interdependence: People are an inseparable part of the environment. We are part of a system that links individuals, their culture and the bio-physical world of nature.

The environment contains three elements: nature, culture and individuals. All three are linked as interdependent parts of a system from which the individual cannot be isolated. Each of us is a part of a culture and our individual perceptions and actions contribute to the total impact of humans on the bio-physical world. We are also part of a culture that has developed an economic structure, technological processes and a political system that allows individuals to obtain the goods and services necessary to maintain a particular lifestyle or way of life. The fundamental issue in this
Learning for a sustainable environment

interdependent natural and social system we call the environment is that it is individuals who have the ability to strengthen, weaken or maintain the relationships between the three elements in the system. Environmental education teaches that everyone has a responsibility to develop and maintain high quality natural and social systems in which individuals know how and are willing to act only in ways that will advance human well-being and maintain ecological sustainability.

2. Sustainable resource management: The bio-physical world contains a range of renewable and finite resources that people can develop to satisfy their needs and wants according to the lifestyle choices they make. However, they should do this with due concern for the needs and rights of future generations.

The survival and well-being of any society depend upon its supply of natural resources to maintain life (air, water etc.), to satisfy basic needs (shelter, food etc.) and to provide a certain degree of comfort, convenience and even luxury (cars, electrical goods, air conditioning etc.). Everyone is influenced by the values and expectations of his or her society and, as individuals, will make lifestyle choices that depend on consuming resources to a greater or lesser extent. Environmental education can help students develop a sound understanding of natural resources – their characteristics, distribution, status, and present and potential uses – in order to make informed decisions on which resources to consume for which purposes. This involves learning about the natural world and the functioning of ecosystems as well as about the way different cultures have perceived and used resources. In addition, students need to appreciate that, as people use natural resources, they alter the bio-physical world and create a variety of human landscapes such as mining landscapes, farming landscapes, small country towns and large cities. Understanding these landscapes and the resultant ways of using resources involves some familiarity with the impact of technology on society and its use of natural resources, various ideas for urban and rural design, the operation of transport systems, and the nature of the political and legal systems that control the use of resources. A fundamental value behind such understandings is a commitment to the belief that the use and management of resources should aim at high quality natural and social systems that enhance human well-being in balance with ecological sustainability – and not just for this generation but also for future generations.
3. Sustainable values and lifestyle choices: The ecological balance of natural ecosystems is always affected by the degree of human impact in the development of resources. Sometimes, the environmental problems that result from the unplanned or unwise use of resources are so severe that changes in management practices and human lifestyles are necessary to ensure ecologically sustainable development.

The aboriginal people of many societies have shown that it is possible to live in a state of relative balance and harmony with the environment. These societies developed a culture that views people and the natural world as inseparable. However, these ecologically sustainable societies have been supplanted in many parts of the world by social and economic systems that largely view nature as a “cornucopia” to supply resources to satisfy every human need and want. The consequences of this view are reflected in the wide range of environmental problems facing the world today: climatic change on a global scale, soil erosion and desertification on a continental scale, disappearing forests, many lost or endangered species of animals and birds, pesticide residues in pasture lands and rivers, the seemingly endless sprawl of suburbia, and congested, polluted city centres. These problems are caused by a complex set of social values and human expectations about “the good life” and their resultant impact on the limits of natural systems.

The study of such issues contributes to the objectives of environmental education by helping students to become responsible environmental citizens. This involves learning how to clarify their values in relation to environmental problems, how to identify the root causes of environmental problems, and how to work towards the solutions of these problems through proper planning, using the legal system, new laws, political participation, improved resource management practices, research and technological developments. Through learning how people in different parts of the world have practiced these skills and clarifying how they relate to local environmental situations, students can come to understand that the resolution of some of these problems will be impossible if society does not act as a whole to alter particular perceptions of the environment and adopt new, more responsible lifestyle practices.

4. Civic participation: Attitudes of concern for the quality of the environment are important to motivate people to develop the skills necessary to find out about the environment and to be willing to take the necessary decisions and actions for environmental problem-solving.

The words “attitude”, “decisions” and “actions” in this context must be based upon more than a knowledge of environmental information. They imply a
Learning for a sustainable environment

combination of informed concern and a willingness to act. Environmental education programs that only teach about the environment will be little more than “water off a duck’s back” unless they provide opportunities for students to explore alternative environmental values and to develop an appreciation and concern for ecological sustainability and human well-being. Such attitudes are necessary to motivate young people both now, as students, and later, as adults, to seek solutions to environmental problems. While knowledge and skills provide an important foundation for responsible environmental behaviour, especially knowledge of how to work effectively with others to solve environmental problems, they count for nothing unless the important affective domain is activated. The World Commission on Environment and Development has argued that these environmental values objectives “cannot be achieved without the involvement of students in the movement for a better environment”. Thus, active involvement in environmental protection and improvement projects is an essential element of environmental education. Of course, action is always the most difficult element to achieve, but if it is not there in some way, one is left with education for its own sake, nothing more.

Curriculum planning and pedagogy for environmental education

Curriculum planning and pedagogical issues are interdependent aspects of the process of teaching. Guiding learners towards a comprehensive understanding of the key ideas in environmental education and the associated skills, attitudes and values requires approaches to curriculum planning and pedagogical patterns markedly different from the traditional concept of the teacher as the disseminator of discipline-based knowledge.

In relation to curriculum development, effective environmental education requires co-operative planning between all teachers and departments in a school. The scope and potential of environmental education is greatly diminished when it is seen as a subject in the timetable rather than as a synthesis of ideas, values and skills from many disciplines that can be developed through all subjects. Thus, environmental education requires a permeability, or even the breaking down, of subject boundaries, especially in secondary schools. New forms of curriculum organization based upon the interdisciplinary and multi-disciplinary study of questions, issues and problems or relevance to students and their communities - and a gradual widening of perception of what a “community” is so that students appreciate the global nature of contemporary life – are required. Such practices replace subjects with the needs of students and their communities as the centre of the curriculum planning process. This requires a reconceptualization of curriculum so that knowledge and skills selected from the
Learning for a sustainable environment

disciplines are seen as means to the ends of education rather than as ends in themselves for students to make meaning and use of as and when they can. This view of curriculum has implications for syllabus design and the planning of works programmes, assessment procedures and timetables in schools. It also has implications for the way teaching and learning are approached.

Environmental education pedagogy is based upon a view of teaching as a creative and dynamic process in which pupils and teachers are engaged together in a search for solutions to environmental problems. This emphasizes approaches to teaching which involve:

- The active investigation of real problems, rather than abstract and distant concerns, with an emphasis on problem solving and decision-making;
- Lots of first-hand experiences in natural and human environments;
- Close interaction between schools, teachers, pupils and the community;
- The development and application of skills for scientific and social investigation – observation, measurement, classification, experimentation, prediction, analysis, interpretation, synthesis, evaluation and decision-making, etc.;
- Using the values of sustainability, democracy and social justice as criteria for judging the validity of answers to questions such as: Who took this decision? According to what criteria? With what ends in mind? Have the long-term consequences been calculated?
- The development of a sense of pleasure, wonder, curiosity and excitement in learning;
- The clarification, analysis and critique of students’ own viewpoints and values and those of other individuals, groups and institutions;
- A focus on the application of school learning to the community through opportunities to act on the solutions they planned, through the evaluation of alternative courses of action, direct experience in social participation, and reflection on the actions undertaken; and
- Empowerment of students and teachers to work together with their communities to help improve the quality of life and the environment.
These principles for teaching and learning in environmental education give rise to pedagogical patterns based upon a variety of individual and group learning experiences and a variety of teaching strategies, such as inquiring learning, simulation, role play and action research. In these strategies the students retain the locus of control in learning and decision making power is shared between pupils and teachers wherever and whenever possible. These aspects of pedagogy reflect the best of contemporary thinking and practice in education today.

**Conclusion**

The next chapter provides examples of how the goals, objectives, key ideas and principles of environmental education are being implemented in a range of countries in Asia and the Pacific. As such, it illustrates the context for policy and practice in environmental education into which graduates of teacher education programmes will be seeking employment, and the type of innovative teaching skills that those already in the teaching service may need to develop further.
Chapter Three

ENVIRONMENTAL EDUCATION IN THE
ASIA-PACIFIC REGION¹

The space limitations of devoting one chapter in a short monograph such as this to an overview of trends and developments in environmental education across the countries of Asia and the Pacific do not allow for a comprehensive undertaking. Thus, the chapter seeks to provide a number of examples which illustrate the variety of ways in which environmental education is interpreted and practiced in the region. The examples highlight the diverse ways in which the environmental education policies and curriculum approaches described in the previous chapter are being received and interpreted by education systems and schools.

The purpose of this chapter is to indicate a range of the environmental education skills and teaching strategies which teachers throughout the region will increasingly be required to possess, and which pre-service teachers are likely to require at teaching practice and in their initial school placements.

National education contexts

A number of factors have influenced the development of environmental education in the widely different countries found in the Asia-Pacific region. The two over-arching factors are national education policy and national environment and population policy. These policies in any one country are a reflection of national cultural values, priorities and socio-economic goals. The quality of the environment and the quality of human life exist in dynamic equilibrium with these national policies — and the national environmental education policy is a result of decisions made in these broader fields of national policy.

1. This chapter is adapted from material written by John Fien as a synthesis of the Country Reports presented to the 1993 UNESCO-ACED conference on “Environmental Education and Teacher Education in Asia and the Pacific” hosted by NIER, Tokyo. The material first appeared as Chapter 2 in the conference report (NIER 1993). The authors are grateful for NIER permission to include the development of this material in this chapter.
Environmental education in the Asia-Pacific region

National policies on environment, population and sustainable development are becoming influential in environmental education, either as a source of strong policy direction and curriculum development, and/or as a basis for supporting environmental education initiatives in various government departments and by non-government organizations (NGOs). Educational reform and development is an on-going priority in all countries in the region. In some countries, environmental education is being given great importance as a means of addressing pressing environmental concerns, and is being incorporated into many school programmes and activities. In other countries, environmental education is being infused more slowly – not because it is not seen as important – but because of current educational priorities and financial constraints.

The status of environmental education in the region

Environmental education is a dynamic process that can help to reduce and solve some of the problems of environmental degradation faced by the countries of the region. Rather than establishing a new subject called environmental studies, most countries are presently infusing environmental education objectives and strategies into existing curricula. This is viewed as a strength because the content of environmental education is relevant to the themes in many learning areas such as social studies and science, and duplication can be prevented. In addition, the focus on practical learning in the real world in environmental education helps schools address important general educational objectives related to values and to skill development.

An emerging trend is the integration of environmental, population and development education in several countries. This is a reflection of national policies in these fields and a desire to see education contributing to the integration of national social, cultural and economic goals. Thus, nature study and the management of natural resources such as forests, water and the sea are no longer the only aspect of the environment being studied. Besides these concerns, environmental education now can focus on ways of improving the quality of life for all people, rich and poor. These issues often relate to housing, sanitation, hygiene, health, waste management, energy, population and security of access to life essentials such as water, food, shelter, work, transport, dregs, health and recreation.

In some countries, nationally determined syllabuses provide for a co-ordinated programme of environmental topics in both primary and secondary schools. Other countries have developed environmental education guidelines which support schools and teachers. However, there is, unfortunately, often a lack of co-ordination in the
national environmental education framework which prevents the development of a comprehensive environmental education programme for all students. This means that all countries in the region suffer from some of the following barriers to environmental education at some levels of education at various times:

- Some rigidity of syllabuses and examination processes;
- A strong disciplinary orientation and inflexible timetables, especially in secondary schools;
- A lack of up-to-date, topical local materials, especially of a visual type;
- Little co-ordination between government departments, and between government, departments and NGOs;
- Little co-ordination between schools and their local communities; and
- A lack of pre-service and in-service teacher education in environmental education.

Examples of innovation in environmental education in the region

Nevertheless, many examples of innovative practice in, and support for, environmental education may be found across the region. The following examples are presented in alphabetical order of country name. The list does not give priority to one country or one approach over others. Instead, its purpose is to illustrate the range of innovations in environmental education to be found in the region and which may become increasingly widespread as the innovations are diffused and some of the barriers indicated above are overcome.

Australia

- There is a tradition of school based curriculum development within broad framework syllabuses which encourages local innovation and across-the-curriculum support for environmental education.
- There is a series of state policies, curriculum guidelines and support materials for environmental education.
- There is integration of professional development with curriculum development in Landcare Education programmes.
Environmental education in the Asia-Pacific region

China

▼ Environmental protection is a basic state policy.

▼ Chaohou City was named by UNEP as one of the “500 Best Cities in the World” in 1989 for its achievements in environmental education, where 200,000 students in over 1,000 schools underwent an environmental education programme which combined in-school and out-of-classroom activities.

▼ Environmental education is permeated into courses in nature study, biology, geography, chemistry and physics in secondary schools.

India

▼ The National Policy on Education of 1968 and 1986 has increasingly made environmental themes integral aspects of the curriculum.

▼ The National Council of Educational Research and Training (NCERT) has produced model national textbooks for Years 3-5 on environmental studies. Beyond Year 6, texts of all subjects are to include environmental education.

▼ Workbooks for Years 6-8 to develop a village profile have been produced by UKSN in the Himalayas.

▼ The Supreme Court of India has made a court order to ensure all education systems promote environmental education.

▼ Environmental themes are integral to adult and non-formal education.

Indonesia

▼ There is a network of Environmental Study Centres in universities and environmental education has been incorporated into national policies on environmental management.

▼ There is a system of non-degree training programmes in environmental impact assessment and other topics.

▼ There is widespread co-operation between schools, universities and community groups in local action projects, such as Clean River Campaigns.
Learning for a sustainable environment

Japan

▼ Comprehensive attention is given to environmental topics in a wide range of primary and secondary school subjects.

▼ Issues concerning the promotion of environmental education have been identified. For example:

· The need to relate environmental education to pupils’ lives to improve quality of life; and

· The development of teaching materials, especially on the local environment covering the full range of environmental education perspectives.

▼ Links between schools and administrative agencies have been developed, for example, the Ministry of Environment and the Ministry of Education have joined forces to produce guidance notes and supplementary readers for primary and lower secondary schools, and to co-ordinate in-service education and research.

Malaysia

▼ “Man and Environment” topics have been integrated into five subjects in primary school: Social Science, Health Education, Civics, History and Geography.

▼ There is a wide range of co-curricula activities, such as nature clubs, Environment Week, camping, “School in the Garden”, and environmental education projects.

▼ There is support for environmental education from Government Agencies, NGOs and the media.

New Zealand

▼ Involvement of the NGO sector in environmental education is strong. NGOs involved include the New Zealand Natural Heritage Foundation and the Environmental Education Centre of New Zealand.

▼ School/university links provide special programmes for teachers and students through programmes such as Eco-school and Enviro-school.

Philippines

▼ Environmental concepts and skills have been integrated into National Minimum Learning Competencies for elementary schools and Desired Learning Competencies for secondary schools.
Environmental education in the Asia-Pacific region

▼ A national environmental education review gave strong support for development strategies for formal and non-formal environmental education.

▼ There is a strong curriculum materials and professional development programme in environmental education for teachers.

Republic of Korea

▼ There is an environmental Conservation Model School programme to provide examples of environmental education across-the-curriculum.

▼ Environmental education is central in the new Sixth Curriculum from 1995. At the secondary school level it will be a separate subject.

Singapore

▼ Environmental Education is central in the government’s plan to become a Model Environmental City by 2000.

▼ There are at least fifteen different governmental and non-governmental institutions that are actively involved in promoting environmental awareness and action nation-wide.

▼ There is a successful “Clean River” campaign and the promotion of the annual “Clean and Green Week”.

▼ Environmental education is already incorporated in the academic and curriculum studies in the pre-service teacher education. Experiential learning forms an integral part of teacher education through subjects such as Biology, Geography, Social Studies, and Moral and Civic Education.

Sri Lanka

▼ There is a strong connection between culture and religion and the philosophy of environmental education.

▼ The National Education Commission requires schools to contribute to “the evolution of a sustainable pattern of living”.

▼ There is strong integration of environmental topics into primary and secondary curriculum, and “Environmental Pioneer Brigades” and Environmental Clubs are being set up in some schools.

▼ There is active NGO involvement in environmental education.
Learning for a sustainable environment

Thailand

▼ Environmental education is integral to the issues of quality of life and health, and policies on social, economic and ecological sustainability.

▼ Environmental education is integrated into three units in the Life Experiences curriculum in elementary schools. Life Experience integrates Science, Social Studies, and Health and Moral Education.

▼ Community development electives in junior secondary social studies provide wide opportunities for student participation in working to solve local environmental problems.

▼ There is a goal to have an accredited environmental park in every village (2600 in 1993).

Viet Nam

▼ Environmental education is integral to the 1991 National Plan on Environment and Sustainable Development.

▼ There has been incorporation of environmental education into three subjects in primary school (Finding Nature and Society, Health Education and Moral Education) and three in secondary school (Geography, Biology and Moral/Civic Education).

▼ The National Festival of Growing Plants has been incorporated directly into the curriculum, with inter-Ministry co-operation.

Conclusion

The examples of innovative practice in environmental education in this section illustrate that the key to effective environmental education is environmentally educated teachers – teachers who have a commitment to the knowledge, skill and values objectives of environmental education. However, such teachers are not found in all schools, despite the policy initiatives of education systems and the lighthouse-style examples of schools and teachers undertaking innovative environmental education. Thus, the widespread diffusion and adoption of the principles of environmental education remains one of the important tasks for the 1990s. The central role of the teacher in the diffusion of any innovation means that teacher education, at both the pre-service and in-service levels, is vital. The purpose of the next chapter is to outline the central role of teacher education in the development of environmental education.
Chapter Four

ENVIRONMENTAL EDUCATION IN TEACHER EDUCATION: THE PRIORITY OF PRIORITIES

The previous chapter concluded with a testimony to the central role that environmentally educated teachers – teachers who have a commitment to the knowledge, skill and values objectives of environmental education – have to play in ensuring that all students have an opportunity to learn how to play their roles in working with their communities in the transition towards a sustainable environment.

The UNESCO-UNEP International Environmental Education Programme has described the preparation of teachers as “the priority of priorities” for action to improve the effectiveness of environmental education (UNESCO-UNEP 1990, p. 1). In an earlier report on this topic for the International Environmental Education Programme, Wilke (1985) stated that:

*The key to successful environmental education is the classroom teacher. If teachers do not have the knowledge, skills and commitment to environmentalize their curriculum, it is unlikely that environmentally literate students will be produced (p. 1).*

The role of teacher education in promoting environmental education has been well documented in the UNESCO-UNEP International Environmental Education Programme. The Tbilisi Intergovernmental Conference (UNESCO 1977a) highlighted its importance by maintaining that the future of the environment may depend upon the ability of teacher education to incorporate and practice an effective environmental education curriculum. This conference recognized that the introduction of environmental education into schools greatly depended on the extent of training which teachers received in this field. It argued this on the basis that:

*It is obvious that even the best curricula and the best teaching materials cannot have the desired effect if those with responsibility for them have not fully understood the objectives of environmental education and if they are not capable of directing the learning activities and experiments comprising such education or of effectively using the materials available to them, (UNESCO 1980, p.47).*
In Asia, Mishra et al. (1985) have highlighted the vital role of teacher education by arguing not only that it equips teachers to teach environmental education effectively but also that it acts as a stimulus to its introduction into the school curriculum. They anticipate that the development of an effective teacher training course in environmental education would result in a top-down curriculum innovation approach. These writers perceived teacher education in the field, for both primary and secondary school teachers, to be the most effective means of reaching an acceptable level of environmental education among the population.

Special training and commitment are necessary to bring the environmental thrust into education because environmental education requires a new focus and outlook within education which prospective teachers may not have experienced in their own education (Halverson 1982; Mishra et al 1985). This new outlook has been described as the exploration of “a new personal and individualized behaviour based on the ‘global ethic’ which can be realized only through the enlightenment and training of educational professionals” (Simpson et al 1988, p. 17). Thus, a teacher cannot teach environmental education effectively solely by obtaining information on environmental concerns, by studying environmental science. Instead:

*Intensive teacher education, not merely orientation, is essential if the present fragmented approaches of traditional education are to be transcended in favour of a holistic, global approach, and interdisciplinary and a thorough change in both the outlook and preparation of teachers and teacher educators . . . The task is more complex than putting environmental content into existing curricula.* (Simpson et al, 1988, p.17).

UNESCO has an ambitious role for teacher education, perceiving it as “potentially the greatest source of educational change in an organized, orderly society” (UNESCO 1976). Effective teacher education in the field, it argues, will produce an environmentally literate population which in turn will result in environmental action. It thus sees the incorporation of environmental education into teacher training as crucial, not only to the future of the discipline but also to the future of the environment. Not surprisingly, UNESCO has recently referred to teacher education as “the priority of priorities” (UNESCO-UNEP 1990, p. 1). UNESCO’s interpretation of the role of teacher education in environmental improvement reflects a growing international and intergovernmental recognition of the need to train teachers in the field.
Since 1970, a great number of both international and intergovernmental organizations and agencies have recognized the urgent need to develop environmental education in teacher education programmes. This has been documented in many conferences, such as the International Union for the Conservation of Nature and Natural Resources (IUCN) “Environmental Education” Conference (1971), the International Belgrade Workshop (1975), the Tbilisi Conference (1977) and the more recent United Nations Conference on Environment and Development, the Earth Summit (1992).

Teacher education was recognized as “the most intense ENVIRONMENTAL EDUCATION need and priority by nations of every region of the world” in their responses to a UNESCO questionnaire preceding the Belgrade Workshop in 1975 (UNESCO-UNEP 1990, p. 1). The earliest recorded international concern for adequate teacher training in the field of environmental education was expressed at an IUCN conference in Switzerland in 1971. At this conference, the representatives of over a hundred countries highlighted the importance of teacher education:

We recognize that teacher training forms one of the most important and significant aspects in the development of environmental education programmes and we recommend that:

a) The training of teachers provides them with essential basic knowledge of ecological facts and an adequate background of sociology and its relationship to human ecology:

b) Efforts should be made to develop in teachers a critical awareness of environmental problems to enable them to provoke responsible attitudes concerning environmental matters in their pupils;

c) Environmental conservation is recognized as an essential part of the teacher training and that developments started in pre-service training should be continued by in-service training;

d) As teacher training in environmental education involves the use of many techniques and methods, all prospective teachers should be given training in the use and evaluation of pedagogic methods, including those relating to inter-disciplinary approaches and team teaching; and
Learning for a sustainable environment

e) Media banks be established at the national and international level for the exchange of nomination training aids and teaching materials (IUCN 1972, p.3).

Later, in 1975, the Belgrade Charter, which arose from a UNESCO International Workshop, identified teachers as one of “the principal audiences of environmental education”. It called for the development of well-designed programmes aimed at educating teachers in this field. More significantly, the Belgrade Charter provided a starting point for establishing appropriate principles for the design and development of a teacher education curriculum.

The need for teacher training in environmental education was also emphasized at UNESCO-sponsored regional meetings during 1976-77. The training of teacher personnel was seen by participants at all regional meetings as one of the most fundamental aspects of environmental education. For example, at the Arab States regional meeting held in Kuwait in 1976, it was concluded that “the principal need for the further development of environmental education was seen as the restraining of teachers and leaders; recommendations were made to urge the strengthening of existing training programmes and the creation of new ones” (UNESCO 1977b). Wilke, Peyton and Hungerford (1987) maintain that similar conclusions were arrived at in all regional meetings. These meetings led to the publication of Needs and Priorities in Environmental Education: An International Survey (UNESCO 1977b). The survey documented the need, apparent across countries and educational levels (pre-school, primary, secondary, tertiary), to train teaching personnel in environmental education.

At the first intergovernmental conference on environmental education, convened by UNESCO in Tbilisi in 1977, Ministers of Education from around the world unanimously agreed that environmental education should be an obligatory part of both pre-service and in-service teacher education and considered this “a priority activity” (UNESCO 1978, p. 5). One of the guiding principles laid down at Tbilisi argued that there was a “need to strengthen ordinary pre-service and in-service training programmes for teaching personnel aimed at making them capable of including an environmental component in their teaching activities” (UNESCO 1980, p. 46). The Conference Final Report requested that all Member States plan:

... the establishment at the national level of a programme of action, with the aim, on the one hand, of familiarizing teachers and educational administrators and planners with different aspects and problems of the environment and, on the other hand, giving them a
Environmental education in teacher education

basis of training which would enable them to incorporate environmental education effectively into their respective activities. This action should take the form of both p-e-service and in-service training (UNESCO 1978, p. 24).

Specifically, Resolutions 10 and 11 of the Tbilisi Declaration called upon these programmes to include a basic level of training for both in-service and pre-service, which would enable teachers to incorporate environmental education effectively into their activities. Similarly, the International Congress on Environmental Education and Training, ten years later in 1987 in Moscow, resolved that:

Teacher training is a key factor in the development of ENVIRONMENTAL EDUCATION. The application of new environmental education programmes and proper use of teaching materials depends on suitably-trained personnel, as regards both the content and the methods specific to this form of education. Teachers well trained in the contents, methods and process of ENVIRONMENTAL EDUCATION development can also play a crucial role in spreading the impact of ENVIRONMENTAL EDUCATION at the national level, thus increasing the cost-effectiveness of the efforts made by member States to develop environmental education . . . . There is a need to identify the national objectives of the training of teachers and to develop plans for the training of teachers which can be implemented by the training authorities (UNESCO-UNEP 1988, p. 12).

The United Nations Conference on Environment and Development (UNCED) also highlighted the need for improving teacher education in the field. The Agenda 21 chapter on Education, Public Awareness and Training identified “training as an important “programme area”. In it, governments committed themselves “to update or prepare strategies aimed at integrating environment and development as a cross-cutting issue into education at all levels within the next three years” (UNESCO-UNEP 1992, p.3). The document specifically calls upon educational authorities to assist the development of pre-service and in-service training programmes which address the nature and methods of environmental and development education for all teachers.
Learning for a sustainable environment

Environmental education within pre-service teacher education: an international status report

Despite the various pronouncements at conferences and the growing international and national support for environmental education, relatively little has been accomplished. As a result, environmental education within teacher education remains more a policy recommendation than a practice. Thus, Williams (1985) notes:

_The impetus that concern for the environment has received in the past twenty years or so has not been entirely translated into action with respect to teacher education, in spite of the urgings and warnings of significant international reports and studies which attached great importance to the role and function of teacher education. (p. 46)_

Ministers attending the Tbilisi Conference in 1977 recognized important deficiencies in environmental education at the teacher training level and concluded that “few countries, if any, adequately prepare teachers to effectively achieve the goals of environmental education in their classrooms” (UNESCO 1978). As a result, they unanimously agreed that environmental education should be an obligatory part of both pre- and in-service teacher education. Yet, over a decade later, this is “still to be universally applied” (UNESCO-UNEP 1990).

A review of research on the provision of environmental education within teacher education reveals that not much has changed in the years since then. Both developed and developing countries alike are seen as experiencing what Selim (1977) then described as “a gap between a clearly perceived international commitment and an inadequate degree of practical implementation” (p. 129). At that time, pre-service and in-service preparation programmes in environmental education were relatively scarce and poorly developed, Selim (1977) noted that:

_Well developed and strongly supported curricula in environmental education for students training to be teachers do not pervade tertiary level institutions. . . such efforts seem to be limited to individual exemplary programs dotted around the globe (p. 129)._  

Sufficient data from all regions of the world exist to indicate that not much has changed since then. For example, despite some interesting small scale developments, not one of the Asia-Pacific countries represented at the 1993 UNESCO-ACEID conference on “Environmental Education in Teacher Education in Asia and the Pacific” reported that it had a comprehensive national approach for implementing environmental education through teacher education even though individual institutions
were conducting quite innovative programmes in this area (NIER 1993). Other national and international surveys of initiatives in pre-service teacher education provision for environmental education in several parts of the world reveal a similar pattern of growing interest but little co-ordination (see Bowman and Disinger 1980; Coon 1980; Peyton and Hungerford 1980; Stapp et al 1980; Williams 1985, 1988, 1992; Mishra et al. 1985; Simpson et al. 1988; Ballantyne and Aston 1990; NIER 1993; Education Network for Environment and Development n.d.).

Thus, Mishra et al. (1985) have described the situation in initial teacher education with respect to environmental education as extremely “desperate” while Wilke, Peyton and Hungerford (1987) claim that the number of effective environmental education teacher training programmes in the world is far below the acceptable level. Thus, there is a critical worldwide shortage of teachers with the necessary competencies to incorporate the environmental dimension into education effectively.

Pre-service teacher training efforts in environmental education vary greatly, not only from nation to nation but also from institution to institution within nations. Programmes differ in structure, approaches, facilities and even duration. Yet, the situation is as Selim described it in 1977, programmes of environmental education within pre-service and in-service teacher education are still inadequately developed.

UNESCO (1977c) not only noted that relatively few efforts had been made within teacher education, but also went further to identify inadequacies within the existing programmes as most of the courses were perceived as lacking a holistic conception of the environmental situation. The programmes were also criticized because they did not encourage the development of any inter-disciplinary techniques or team-work. Teaching methodologies were seen as particularly inappropriate since they “did not take into account the modern educational ideas of participation, research and experimentation of methods . . . [and] evaluation indispensable for learner-centred education” (p.23).

Research by Stapp et al. (1980) focused on pre-service teacher training courses and uncovered severe inadequacies within the methodological aspects of programmes. They argued that, although many institutions recognize the need for inter-disciplinary methodological training, very few can adequately address this need, finding that traditional discipline-orientated education approaches dominate. They also found that “... few courses would allow students to develop problem-solving skills” (p.4).

The research reinforced earlier findings, pointing to the dominance of the traditional approaches to teaching. This, they argued, encouraged student teachers to
Learning for a sustainable environment

become solely concerned with learning environmental knowledge and then with the transfer of this information on to the student through the “lecture approach”. This approach was based on the assertion that there is a linear correlation between the acquisition of ecological knowledge, the development of environmental attitudes and the adoption of environmental ethical behaviour. However, the current understanding of environmental behaviour and action-taking strongly indicates that this may not be the case (Wilke, Peyton and Hungerford 1987).

Research by Williams (1988) indicates another problem with existing approaches to environmental education within teacher education courses. This is that studies of the natural sciences remain influential in terms of subject matter and approach with a heavy emphasis on field study, scientific methods and the investigation and analysis of particular areas of knowledge. His research also reinforced earlier findings which pointed to the lack of an inter-disciplinary approach within teacher education courses.

Williams maintained that, in this way, environmental education had become a “sub-contracted” element within another discipline or subject area. He argues that this is inappropriate because it has led to an imbalance in approach, and a fragmentation of meaning, in that it provides:

... an insular interpretive framework for investigation and analysis of issues and problems. Further, it has reduced the scope of the substance and the methodology of the area of study by eschewing inter-disciplinarity in approach and synopsis in the evaluation of content (Williams 1988, p.3).

Williams believed that the sometimes controversial nature of environmental education had led to the development of this “selective curriculum”, in which only certain “safe” methods and knowledge were taught. Furthermore, his findings indicated that courses avoided linking environmental education with other controversial areas of study and omitted consideration of political, economic and cultural perspectives. He argued that the result of this is that:

... the espousal and advocacy of a holistic, critical education approach to teaching about environment and development within the school curriculum has in itself become a controversial, political issue. The consequence of this has been to play it safe; environmental studies or environmental science, being the acceptable substitutes or alternatives, bury the problems within legitimate subjects (Williams 1988, p.4).
Environmental education in teacher education

This belief echoes those of many researchers who have found that this situation predominates in school curricula also (Greenall 1981; Maher 1986; Robottom 1987a.

Conclusion – and a special need

Although most of this research does not distinguish between provision within primary or secondary teacher training courses, evidence can be found to suggest that the greatest inadequacies occur in the training of the generalist primary school teacher (Stapp et al. 1980; Gayford 1987). These courses place more emphasis on providing environmental information, especially about the natural environment, rather than considering environmental education approaches and methodologies. Furthermore, they stress the cognitive elements at the expense of the affective components of environmental education. The lack of attention to environmental education in generalist primary teacher education is a serious problem in those countries in which basic education is the key priority.

The importance of the primary years of schooling in the education of the child has been grossly under-estimated. Unfortunately, it is an area which has received little attention in the field of environmental education also. The lack of interest in environmental education at this stage, and the under-estimation of the importance of these crucial years, may account for pronounced inadequacies within courses which train teachers for this level.

The lack of appropriate teacher training courses within the field is of great significance to environmental education. The primary school years can prove to be critical for the environmental education of the child. Attitudes towards the environment are generally acquired very early in life and the early years of schooling are formative ones for development of environmental attitudes (Palmer 1992, Tilbury 1993, 1994). The young learners develop most of their “final adult physio-neurological capacity quite early in life, and therefore learning, especially of attitudes and values so important to imaginative action in environmental problems, is vital and needs to be considered carefully early in these sequences of lifelong learning” (UNESCO 1977d p. 88). Thus, the need to correct the existing situation within primary teacher education courses is crucial to the future of environmental education.
Chapter Five

A COMPETENCY BASED FRAMEWORK FOR TEACHER EDUCATION IN ENVIRONMENTAL EDUCATION

The goal of any teacher education effort or programme in environmental education (EE) should be to develop environmental education competencies (Wilke, Peyton and Hungerford 1987 p.29).

The discourse of educational competencies, which began in America in the 1970s is now experiencing a fresh impetus from teacher education. In some parts of the world there has been much official interest in developing a competency based framework for assessing qualified teacher status. Moves of some governments in the region towards greater accountability and assessment of performance have made the concept of competencies an appealing one.

The UNESCO-UNEP International Environmental Education Programme has developed guidelines for environmental education curriculum development in teacher education. These are based upon a model programme outlined by Stapp in 1975. Stapp argued that teachers require knowledge and skills in four areas in order to teach environmental education effectively:

1. Environmental science concepts and skills including:
   - Ecological foundations; and
   - Human ecosystems foundations (or what is known today as “social ecology”), which integrate social, geographic, economic and political studies within an ecological framework.

2. General educational knowledge, including educational and psychological foundations.

3. Environmental education skills, including:
   - Problem solving;
   - Handling values and controversial issues; and
   - Using materials and local situations pertaining to the environment.
4. Curriculum planning and teaching approaches for environmental education, including:

- Aims and objectives;
- EE methods and techniques;
- Resources for learning and group dynamics;
- Curriculum design; and
- Field work and environmental ethics.

This model programme has been adapted and extended for use in a variety of teacher education situations and now includes a comprehensive set of competencies for the environmentally educated teacher which can be translated into objectives for environmental education curriculum development in teacher education (see Appendix). Strategies for incorporating these into teacher education programmes are presented in a number of publications which are available from the International Environmental Education Programme office. The following titles are included in its Environmental Education Series¹:

No. 5  Environmental Education Module for Pre-Service Training of Teachers and Supervisors for Primary Schools (1983)

No. 7  Environmental Education Module for Pre-Service Training of Science Teachers and Supervisors for Secondary Schools (1983)

No. 9  Environmental Education Module for Pre-Service Training of Social Science Teachers and Supervisors for Secondary Schools (1985)

No. 25 Strategies for the Training of Teachers in Environmental Education (1987)

No. 26 Environmental Education: A Process for Pre-Service Teacher Training Curriculum Development (1988)

No. 27 An Environmental Education Approach to the Training of Elementary Teachers: A Teacher Education Programme (1988)

No. 30 An Environmental Education Approach to the Training of Middle Level Teachers: A Prototype Programme (1990)

¹. Publications in the Environmental Education Series of the UNESCO-UNEP International Environmental Education Programme are available at no cost to universities from The Environmental Education Section, Division of Science, Technical and Environmental Education, UNESCO, 7 Place de Fontenoy, Paris 7, France. Other titles in the Series address school-level curriculum development and pedagogical issues and associated in-service education needs.
Learning for a sustainable environment

Approaches to competency-based teacher education

However, not all environmental educators and teacher educators agree with the competencies approach to teacher education. The association of a competence framework with vocational training and its simplistic behavioural objectives has led to a view that competence-based education is primarily skills-based. Many reject the concept of competence in teacher education on the basis of this narrow interpretation which gives emphasis to skill acquisition and ignores the importance of the theoretical underpinnings of performance (Whitty and Willmott 1991). For example, Hyland (1993) perceives all competencies in this way, describing them as crude instruments of behaviorism. He objects to what he interprets as a stress on actions on the grounds that it creates a division between the mental and physical components of performance. Thus, Hyland argues that competence-based education “confuses the evidence which we might use to assess a particular skill or competence with a competence itself”.

Assuming that all competency approaches are behavioristic in nature leads critics such as Hyland (1993) to miss the diversity of concepts of, or approaches to, competency-based education which exist. Similarly those who dismiss a competency framework as a viable framework for teacher education seem unaware of the many different and alternative concepts of competency and, perhaps, are too quick to be dismissive of some favorable features of this approach, as a result.

Thus, for those concerned about competency based approaches in teacher education for environmental education, an important issue must be exactly how the term is defined.

The central feature of the competency-based approach to teacher education is not dependent upon following a specific programme of learning but on the achievement of a number of competencies (Jessup 1991; Whitty & Willmott 1991). These competency statements are primarily product or outcome oriented and define something a person is or should be able to do. However, a variety of meanings can be derived from the term “competencies” (Spady 1977; Norris 1991; Whitty and Willmott 1991; Bridges 1993). Indeed, as early as 1977, Spady labeled the competency movement as “a bandwagon in search of a definition”, a description which is still applicable today.

There are a number of differences between the different competency-based approaches, which appear “driven by different – but perhaps overlapping – values and purposes” (Bridges 1993, p. 3). Norris (1991) has grouped these into three different concepts or “constructs of competence” (p. 332).
Competency framework for teacher education

■ The behaviorist construct

The behaviorist is perhaps the most prevalent construct of competence (Norris 1991). Within this interpretation, competencies take the form of behavioural objectives which are primarily skills-oriented. They essentially consist of a description of the performance and the situation in which it is to take place. These skill-based objectives are presented in a form that is capable of demonstration and assessment.

The behaviorist construct has been subjected to the most criticism, on the ground that it supports the “instrumental vocationalizing” of educational processes (Hyland 1993, p.57). Its competencies are essentially seen as depicting a crude form of behaviorism which stresses performance over the acquisition of knowledge and understanding. The principal objections are that it “artificially separates the mental and physical components of performance and confuses the evidence which we might use to assess a particular skill or competence with competence itself” (Bridges 1993, p. 2).

■ The generic construct

The generic construct was derived from the studies of people exercising higher order professional skills. Elliott (1989) has described generic competencies as “broad clusters of abilities which are conceptually linked” (p.98). The successful development of these abilities is dependent on acquiring an ‘aggregate’ of skills, knowledge, understanding and motivation which are often also defined within the competency. Central to the generic construct is the selection of competencies which define an educated person, as well as a trained, one. This view of competencies acknowledges the importance of higher order skills and the acquisition of personal, as well as professional, goals.

Bridges (1993) argues that the generic construct offers a more sophisticated and, thus, acceptable epistemology than the early crude, behaviourist version of competencies. Norris (1991) believes that its appeal is in the way in which it eschews over-specification of objectives and moves away from a reductionist approach to teaching towards a framework which focuses on the general abilities associated with expert performers.

■ The cognitive construct

The basic premise underlying the cognitive construct is the idea that competence is about potential not solely about behaviour. It attempts to capture the
Learning for a sustainable environment

potential ability of practitioners to internally co-ordinate cognitive abilities with management qualities in a way which will improve performance. Messick (1984) summed up this construct by defining competence as “what a person can do under ideal circumstances as contrasted with performance which is actually done under existing circumstances” (p. 215).

The cognitive construct, like the generic, highlights the cognitive structures embedded in an ability but, unlike other constructs, it uses competencies as a developmental framework for enhancing these structures. The effectiveness of this construct is dependent upon a process-oriented approach to the acquisition of competencies. This interpretation is far removed from the concerns over the limitations of behaviorism.

The authors of this book favour a framework for teacher education in environmental education based on the generic and, to a lesser extent, cognitive constructs of competence. This is because, like many teacher educators, we see the technical approach and training emphasis of behaviorist competencies as unsuitable for any pre-service programme. The task of preparing teachers involves both educating and training the student for classroom practice. A crude behaviorist approach is inadequate for such a task, since “good practice” is not entirely dependent on the acquisition of classroom skills.

The generic version of competencies focuses on the development of higher order skills, and distinguishes between average and expert teachers. This construct can play a vital role in developing expert environmental educators, although it may have limitations for introducing environmental education into already crowded generalist teacher education courses or the short-term nature of many in-service programmes. However, similar to the more sophisticated cognitive construct, it does away with this theory-practice split by including a consideration of the intellectual and attitudinal facets which inform skill development and application. Thus, it highlights the cognitive structures which are embedded in “good practice”. This construct also enables the development of person-related, as well as task-related, competencies necessary for the effective preparation of teachers in environmental education.

**Competencies for environmental education in teacher education**

In a 1987 report for the UNESCO-UNEP International Environmental Education Programme, Wilke, Peyton and Hungerford defined an effective environmental educator through a set of what they describe as “expected behavioral competencies” (1987, p. 3). The key assumption underlying their work is the idea that
the first step in the design of any curriculum framework is the definition of the desired end-product. They perceived the specification of behaviorist competencies as the most functional way of defining this end-product (Wilke, Peyton and Hungerford 1987). While the content of their recommendations has its origins in the early ideas of Stapp (1975), this grounding of their work in the behavioral approach to competency based teacher education means that it has severe limitations for the reasons outlined in the previous section.

It 'also has severe and limiting implications for the forms of environmental education that can be developed from them. The competencies they recommend convey a scientific and fragmented outlook of the causes of and solutions to environmental problems which has great consequences for the type of environmental education they advocate.

Wilke, Peyton and Hungerford (1987) contend that teachers require at least two sets of dated environmental education competencies:

Set 1. Foundation competencies in professional education; and
Set 2. Competencies in environmental education content.

A detailed listing of the competencies in these two sets is provided in the Appendix.

We have little problem with the categorization of these two sets and believe that there is great value in the competencies they list in Set 1, although we do disagree with their suggestions for developing them. However, we believe that their conceptualization in Set 2, “competencies in environmental education content”, is critically flawed.

Our first concern is with their scientific orientation which conflicts with the holistic philosophy and cross-disciplinary approaches of environmental education, especially education for sustainability. Wilke, Peyton and Hungerford (1987) divide the competencies in Set 2 into four levels. Level I is entitled “ecological foundations” and is so heavily reliant upon ecology as “science” that it expects that all teacher education students will learn, amongst other things, that:

**H. There is a general decrease in excess potential energy and in energy flow per unit of biomass as ecosystems change to a more mature stage**

and that
J. The population as an organizational level is the basic unit of ecosystem. Each population occupies a specific function niche which “fits” into the organization of the ecosystem (e.g. as part of the energy flow and biochemical cycles) (Willie, Peyton and Hungerford 1987, p. 34).

The level of detail and specification of these statements raises the question of whether the acquisition of such knowledge is necessary for the preparation of generalist teachers. The ecological concepts underpinning these competencies are those usually associated with environmental scientists and are inappropriate for the preparation of generalist teachers in environmental education. This is not to say that there is no place for the scientific dimension. On the contrary, science and science education can play an important role in the development of environmental education, along with the other areas of learning and experience. Yet, the ecological goals specified above do not constitute a crucial component of environmental education. Furthermore, the competencies’ emphasis on ecology (the term “ecology” or “ecological” appears in 10 out of the 16 competencies in this section) presents a distorted view of the range of disciplinary fields upon which environmental education should be based.

The dominance of the scientific paradigm is not limited to an emphasis on ecological content but is also reflected in the scientific terms like “monitor” (rather than observe) used elsewhere in the statements of competence. For example, this distorted outlook may be found at “Level II – Conceptual Awareness”, where student teachers are expected to only consider:

(15) . . . how individual behaviors impact on the environment from an ecological perspective (Wilke, Peyton and Hungerford 1987, p. 35).

Other perspectives (e.g. historical, economic and political) are just as important to environmental education as the scientific and need to be given equal weighting within the competencies.

So, as a result, we believe that this original listing of competencies is unsuitable for general teacher education in environmental education. In order to effectively prepare teachers in environmental education, these competencies would need to be redefined to establish a balance between the areas of learning and to incorporate the goals of environmental education for sustainability. The following section is an attempt to suggest a listing of competencies which adequately address such needs.
The underlying principles, goals and assumptions of education for a sustainable environment were identified in previous chapters and provide the rationale for the selection of the specific competencies which constitute a teacher education framework for environmental education which we suggest here. The purpose of the framework suggested here is to provide a structure for integrating and developing environmental education within existing (and prospective) teacher education programmes.

The aim of the framework is to develop an environmentally educated teacher who has the knowledge, skills and commitment to introduce environmental education effectively into the curriculum. Through this aim, the competency-based framework we recommend attempts to address the personal, as well as professional, development of teachers and to be useful at both pre-service and in-service education levels.

A philosophical basis for environmental education

The framework interprets the ultimate purpose and justification for environmental education to be that of environmental education for a sustainable environment. The following statements on environmental education not only served as guiding principles for the selection of competencies but also are to be reflected in the view of environmental education conveyed to the teachers.

Holism constitutes the philosophical basis of environmental education. This philosophy is encapsulated in the selection of the concepts which we see as central to environmental education. Thus, the framework adopts a holistic outlook on the meaning of concepts such as the environment, environment and development problems, environmental education processes and principles, and on the skills and knowledge the environmentally educated teacher should have. For example:

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2. This framework which first appeared in Tilbury (1993), was the end-product of a three-year research project into environmental education at the teacher education level. The nature of the competencies developed in the framework was enriched by interactions with participants at the 1993 UNESCO Asia-Pacific Regional Experts’ Meeting on Overcoming the Barriers to Environmental Education through Teacher Education.
Learning for a sustainable environment

1. **The environment**: The framework views the environment holistically with reference to:

   . Environmental scales (local to global);
   . Environmental dimensions (social, economic, political, historical, cultural, aesthetic, physical and biological); and
   . Environmental perspectives (e.g. gender and indigenous people).

2. **Environment and development problems**: The framework views environmental and development problems as interrelated; it is not possible to study environmental issues except in terms of the alternative proposals that humans have for the use of resources. The literature reviewed in previous chapters revealed that reports compiled by non-governmental, governmental and inter-governmental agencies agree that environmental education should concern itself with the major environmental and development problems of our time, which they variously identify as: climatic change; depletion of natural resources; loss of biodiversity and extinction of species; landuse management: deforestation; desertification; waste management; urban growth; traffic planning; water, air, land and noise pollution; population growth; famine; and conflict. Although these are global problems which need to be tackled by all environmental education programmes, they are not the only environmental issues which need to be considered. Local, regional, national and cultural issues, which vary from area to area, are also important components of environmental education content.

3. **Interdisciplinarity**: The framework is also holistic in its approach to learning through its consideration of all areas of experience (human and social, aesthetic and creative, linguistic and literary, mathematical, moral, physical, scientific, spiritual and technological). Any environmental education framework must ensure that all these dimensions are present and that parallels are drawn at all scales, whatever the issue under investigation.

4. **The environmental education process**: The framework is based on the integration of education in, about and for the environment. Thus, the components of environmental education for a sustainable environment outlined in previous chapters are taken as the guiding principles for the development of environmental education competencies. These are:
Competency framework for teacher education

- Environmental education for sustainability is relevant;
- Environmental education for sustainability is holistic;
- Environmental education for sustainability is values-orientated;
- Environmental education for sustainability is issue-based;
- Environmental education for sustainability is action-orientated; and
- Environmental education for sustainability is critical education.

5. **Pedagogical approaches:** Achieving the goals of education for a sustainable environment requires a pedagogy which not only encourages learners to become more knowledgeable and interested in the environment, but which also can enable them to become actively involved in the resolution and prevention of environmental problems, both individually and as part of a group. This necessitates the use of a diversity of teaching and learning styles which range from:

- Individual to whole class learning;
- Passive to active learning;
- Competitive to co-operative learning; and
- Disciplinary to cross-curricular learning.

and include games and simulations, fieldwork, issue-investigation, case-study and action research activities.

The competencies of the environmentally educated teacher

The principles of holism outlined in the previous section indicate that teacher education programmes should provide opportunities for teachers to develop two sets of competencies:

I. The competencies of an environmentally educated person; and
II. The professional competencies of an environmental educator.

I. The competencies of an environmentally educated person

An environmentally educated person is characterized by a knowledge and understanding of environmental issues and problems, critical thinking abilities, sustainable environmental attitudes and values, and a range of skills for environmental
action. These four sets of characteristics are outlined below as a range of competencies from which objectives and content for teacher education programmes can be developed.

**Knowledge and understanding of environmental issues and problems**

1. Knowledge and understanding of a variety of environment and development issues and problems at the local, regional, national, international and global level.
2. Knowledge and understanding of environmental concepts which underlie environmental issues and problems.
3. Knowledge and understanding of the conceptual links between local, regional, national, international and global environmental issues and problems.
4. Knowledge and understanding of the interconnections between social, political, economic and environmental systems, as relevant to the study of environmental issues and problems.
5. Knowledge of a variety of environmental dimensions (e.g. social, economic, political, historical, cultural, aesthetic, physical and biological) and an appreciation of their importance in understanding environmental issues and problems.
6. Knowledge and understanding about the chemical, physical, biological, social and aesthetic changes to the environment caused by human activities (such as farming, mining, industrialization, urbanization and tourism) and the environmental issues which surround such activities.
7. Knowledge about how different beliefs and values (i) determine the relationships that people have with their environment, and (ii) those which underlie environmental issues and problems.
8. Knowledge and understanding of how different cultures, and their subgroups perceive the environment and respond to its problems.
10. An understanding of global citizenship and its relevance to environmental issues and problems.
11. Knowledge about the different world religions and their environmental philosophies and perspectives on environmental issues.
12. Knowledge about how music has depicted the environmental relationships and concerns of different cultures including those of indigenous people.

13. Understanding of the importance of sound as a medium for developing and expressing personal feelings about the environment and its problems.

14. Knowledge and understanding of how music can raise environmental awareness and stimulate environmental participation or action.

15. Knowledge and understanding about the environmental and social appropriateness of technological developments.

16. Knowledge and understanding about (i) environmentally-sustaining, (ii) environmental-damaging, and (iii) alternative forms of technology.

17. Knowledge and understanding about the importance of environmental aesthetics in design technology.

18. Knowledge and understanding about how environmental problems influence (i) physical and mental health and (ii) the quality of life.

19. Knowledge about the environment through first-hand experience and outdoor activities in a variety of settings.

20. Knowledge and understanding of (i) what it means to be a consumer (ii) how consumer decisions are made and (iii) the environmental issues surrounding these decisions.

21. Knowledge and understanding about the nature of co-operation and competition between community groups with regards to the environment.

22. Knowledge and understanding about how communities reconcile the conflicting demands and needs of the individuals with regards to the environment.

23. Knowledge about the local, national, regional and international controls and agreements on the protection and improvement of the environment.

24. Knowledge and understanding of how perceptions of nature through history have shaped the environment and environmental concerns.

25. Knowledge and understanding of the historical origins of current environmental concerns.

26. Knowledge about the environmental issues arising from war and conflict.

27. Knowledge about how individual values and beliefs concerning environmental issues change over time and are influenced by personal experience.
Learning for a sustainable environment

28. Knowledge and understanding of some of the solutions for remedying environmental issues and the values perspectives associated with these.

Critical thinking abilities

29. The ability to successfully identify and investigate environmental issues.
30. The ability to critically examine information and data presented by the media and environmental interest groups on environmental issues.
31. The ability to critically interpret data concerning environmental problems and issues from a computer database.
32. The ability to join in the environmental debate.
33. The ability to express critical views about the environment and its related problems through different media.
34. The ability to critically examine the political systems of power and decision-making which influence environmental issues.
35. The ability to critically examine different forms of social organization and their relevance to environmental issues.
36. The ability to critically examine the main political disputes over environmental issues and the differing value positions which underlie these disputes.
37. The ability to become involved in the political process with the goal of addressing environmental issues.
38. The ability to critically examine how the media portrays and transmits images and beliefs about environmental issues.
39. The ability to discuss and consider solutions to personal dilemmas about environmental issues.
40. A critical awareness of how everyday processes and events have consequences for environmental issues and problems.
41. The ability to critically examine their own lifestyles and identify practical ways in which they can contribute towards more sustainable relationships with the environment.
42. A critical awareness of other people’s environmental needs/rights.
43. The ability to critically examine the future consequences of present actions.
Environmental values and attitudes

44. The ability to distinguish between statements of facts and values, in relation to environmental issues.
45. An awareness of the existence of different value perspectives within environmental issues.
46. Respect for different ways of life and environmental beliefs and values concerning environmental issues.
47. The ability to identify, clarify and justify their own value positions regarding environmental issues.
48. A personal environmental ethic, based on a sensitivity to and willingness to care for the natural and social environment.
49. A sense of responsibility for the consequences of their own choices and actions on the environment.

Environmental action skills

50. An awareness of how individual, community, corporate and government actions (or non-actions) can have an impact on the environment.
51. The ability and commitment to participate in environmental decision-making.
52. The ability to work individually as well as co-operatively in the resolution of environmental problems.
53. The ability to collect, classify and present environmental data to support environmental action or non-action.
54. The ability to participate and initiate a range of environmental actions (including negotiation, persuasion, consumerism, political action, legal action, ecomanagement) to improve local and global environments.
55. An attitude to be predisposed to solving environmental issues in a way which is respectful of freedom of choice and is tolerant and fair.
56. The ability to develop, implement and assess action plans and strategies.
57. The ability to predict the future consequences of present actions.

II. The professional competencies of an environmental educator

An effective environmental educator is characterized by a wide range of curriculum and pedagogical knowledge and skills which provide the insights from
Learning for a sustainable environment

which learning experiences in environmental education are developed, taught and evaluated. These are outlined below as a range of competencies from which objectives and content for teacher education programmes can be developed.

An effective environmental educator is characterized by:

1. An appreciation of the urgency of introducing environmental education into the curriculum.
2. An awareness of historical development of environmental education.
3. An awareness of environmental education as a cross-curricular theme.
4. An understanding of the philosophy, characteristics and goals of contemporary environmental education.
5. An understanding of the differences between environmental education and environmental studies.
6. An understanding of and commitment to the three-fold approach of education in, about and for the environmental education.
7. The ability to adapt and develop the competencies in:
   1. Knowledge and understanding of environmental issues and problems
   2. Critical thinking abilities
   3. Environmental values and attitudes
   4. Environmental action
   outlined above.
8. The ability to establish the relevance of their subject specialization’s to environmental education and how subject teaching can be enriched through developing this link
9. The ability to develop values clarification and integration with students.
10. The ability to plan, deliver and assess issue-based learning.
11. The ability to introduce a variety of environmental dimensions (e.g. social, economic, political, historical, cultural, aesthetic, physical and biological) and environmental perspectives (e.g. women and indigenous peoples) in the curriculum.
12. The ability to discuss environmental fears and feelings with students.
13. The ability to introduce and assess the action-oriented component of environmental education.
14. The ability to employ a variety of teaching and learning styles to achieve environmental education goals, including individual to whole class learning; active to passive learning; co-operative to competitive learning; disciplinary to interdisciplinary learning; and include activities such as games and simulations, fieldwork, issue investigations, case-studies and action research activities.

15. The ability to develop environmental education in outdoor settings.

16. An awareness of the contributions of the hidden curriculum in achieving environmental education goals.

17. The ability to critically evaluate environmental education teaching and learning through the use of a variety of assessment approaches.

18. The ability to carry out an environmental audit

19. An awareness of a variety of child development and learning theories and the ability to use these theories in selecting, developing and implementing strategies to achieve environmental education goals.

20. The ability to utilize appropriate theories of moral reasoning in selecting, developing and implementing environmental education strategies to achieve environmental education goals.

It would be unrealistic to expect teacher educators to monitor the development of all the competencies identified above. Indeed, it is not envisaged that all environmental educators and teacher educators will agree with all these competencies and nor is it envisaged that all would necessarily figure in every environmental education teacher education programme. The competencies have been set out in detail to provide an effective planning framework for curriculum developers and administrators in teacher education. They serve as a basis for the development of environmental education provision in teacher education – and as a checklist against which experienced teachers may examine their needs for on-going professional development.

Teacher education programmes need to identify the minimum range of understandings and skills that graduating teachers can be expected to know and use. Increasingly, this must include preparation for dealing with environmental imperatives in an interdisciplinary way. The listing of competencies in this section is one way of conceptualizing the scope of the knowledge and skills needed by such environmentally educated teachers.
Finding a place in the teacher education curriculum for developing a selection of these competencies is a daunting programme given their scope, the limited duration of teacher education programmes, and the many other social and professional demands on them. It is not necessary to prescribe a uniform approach to solving this dilemma. The entry requirements, duration, structure and resources of teacher education programmes vary greatly between countries. In many cases, teacher education institutions and authorities even in the one country vary greatly in their philosophies and their scope of attention to general education versus specialist studies. This situation is complicated further by the need to distinguish between the general environmental education needs of primary and secondary teachers and the specialist needs of various subject area teachers, especially in secondary schools.

However, it is possible to recommend a number of approaches that can be considered in the development of a framework for including environmental education competencies in a teacher education programme:

1. The main aim should be to alert all teachers to their involvement in, and consequent responsibility for, environmental education and to ensure that they have opportunities to develop both sets of competencies outlined in the previous section: (i) the competencies of the environmentally educated person, and (ii) the professional competencies of an environmental educator.

2. Undergraduate teacher education programmes (e.g. Certificate, Diploma and Bachelor level courses in education) should provide all students with core studies which develop both sets of competencies: (i) the competencies of the environmentally educated person, and (ii) the professional competencies of an environmental educator.

3. Postgraduate teacher education programmes (e.g. Graduate Diploma of Education courses) should provide: (i) core studies for all students to develop professional competencies in environmental education, and (ii) elective studies for students whose undergraduate degrees did not include the development of the competencies of the environmentally educated person.
4. Continuing professional development programmes need to be provided so that those already in the teaching service may have opportunities to evaluate their own progress in the two sets of competencies and to have access to specialist resources and personnel in order to develop their expertise in competencies that they believe require attention.

5. The pedagogical approaches of environmental education and relevant professional competencies in environmental education should be infused into all pre-service and in-service education activities in order to model the forms of curriculum organization and teaching being developed. This includes infusion into integrated and/or disciplinary studies in the philosophy, sociology and psychology of education, as well as into courses in teaching processes, curriculum theory, and applied curriculum studies for teaching different school subjects.

6. Additional specialist studies related to both sets of competencies should be provided for students who wish to concentrate in this area. These may be provided through specific course(s) in environmental studies and environmental education and/or through specialist applied curriculum studies for different school subjects.

A number of issues related to these general principles will need to be considered by teacher education institutions and authorities when developing a framework for including environmental education in their programmes. These issues are of two general types: (i) programme planning issues to ensure that all students and teachers receive appropriate opportunities to develop competencies in both environmental studies and environmental education, and (ii) issues related to the pedagogical approaches adopted for developing these competencies. Attention to these issues, especially the latter, is essential as the approach to competency-based teacher education being developed emphasizes the generic notion of competency, rather than the mechanical skills of behavioristic competencies.

1. Programme planning issues

At least six programme planning issues may need to be addressed by Faculties of Education to ensure that the two sets of competencies are developed effectively. Resolving these issues may require much negotiation within institutions and programme committees, as well as a review of student and staff backgrounds, cooperation with other authorities, institutions and academic departments, and a critique of aspects of the hidden curriculum at work in teacher education programmes. It may
place extra demands on practice teaching schools and supervisors, and may involve a
programme of professional development for some teacher educators and in-service
education leaders.

Environmental studies courses

The nature and depth of core and elective environmental studies will vary
between teacher education institutions and programmes, depending upon programme
duration and structure, and faculty and student backgrounds. There should be co-
operation between Schools of Education and environmental studies specialists in other
Faculties to ensure the depth and currency of student learning in this area and to avoid
unnecessary duplication of environmental studies courses between Faculties. Such
collaboration can “encourage teachers to see themselves as part of the wider academic
community in the disciplines they teach” (DEET 1992, p. 19). Inter-faculty co-
operation of this type is especially important for those involved in planning end-on
postgraduate teacher education programmes, to ensure that intending teachers develop
appropriate competencies in environmental studies in their undergraduate degrees.

Environmental education competencies

Environmental education concepts and skills should be infused into all parts of
a teacher education programme to model the precept that environmental education is
relevant to all aspects of the curriculum. Opportunities for infusion will vary
considerable y and there is great scope for experimentation. Many of the general
education and environmental education competencies in the second set of com-
petencies we recommend already feature in the teacher education curriculum,
although the range of environmental education examples in most courses will need to
be expanded. The possibility of unnecessary duplication of some topics and the
omission of others is a potential problem in this infusion approach.

Effective infusion requires careful planning, co-ordination and evaluation and,
if this is not possible, a core course to develop professional competencies in
environmental education should be provided for all students.

Environmental education specialists

Consideration should be given to providing opportunities for students to
specialize in environmental education in their teacher education studies or through in-
service education. This will provide a growing pool of teachers who can act as
environmental education advisers or consultants in their schools and regions, aiding
other teachers to incorporate an environmental education perspective into their work programmes and teaching practices.

**Teaching practice**

All students should be required to prepare teaching activities, lessons and units which reflect the objectives and guiding principles of environmental education and to present them to pupils in teaching practice situations. This will ensure students gain experience in infusing environmental education into existing work programmes, practice their skills in experiential teaching methods, and recognize the professional issues involved in balancing the political nature of environmental education to the expectations of local communities.

Students wishing to specialize in environmental education should be given opportunities to undertake teaching practice placements in environmental education centres where they can work with others to learn how centres are administered, how to work with the diversity of schools, teachers and students who visit centres, and how to provide curriculum planning and pedagogical leadership in environmental education.

**Sustainable environmental practices**

The principles of environmental education, especially those related to sustainability, should be modeled in the hidden curriculum, as well as the formal curriculum, of all educational institutions. This includes a consideration of the nature and condition of the physical surroundings of the school/college, its operational practices (such as energy conservation and recycling), and its organizational principles (such as its community responsiveness and the pedagogical approaches it encourages). The success of environmental education in teacher education programmes may depend on the incorporation of similar principles and practices into the operations of Schools of Education and universities. Ten case studies of universities which have sought to minimize or eliminate the adverse environmental impacts of their operations were published in a special “The Campus and Environmental Responsibility” issue of the journal, New Directions for Higher Education (Eagen and Orr 1992). The case studies cover strategies for energy audits, waste management and reduction, water quality monitoring, campus recycling programmes, monitoring of workplace hazards and occupational safety standards, and environmentally responsible procurement policies.
Learning for a sustainable environment.

Continuing professional development

In-service education, either in the form of short-courses and/or post-graduate studies, is necessary to assist serving teachers to obtain the two types of environmental education competencies and to enable all teachers to develop renewed enthusiasm and advanced competencies in environmental education. The two sets of competencies may be used by education systems, professional associations and universities as the basis for planning in-service education programmes in environmental education.

2. Pedagogical issues

No consideration of environmental education in teacher education can ignore the pedagogical approaches embedded in programme design and employed by teacher education staff. This is part of the hidden curriculum effect mentioned in the previous section. We are not arguing that the approaches adopted by teacher educators must always be consistent with the goals, objectives and guiding principles of environmental education. However, because the pedagogy we employ always reflects one theory or another, we believe that the pedagogical approaches adopted should be derived from an overall course rationale which should encompass an environmental education perspective.

Robottom (1987b, 1987c, 1987d) argues that an environmental education perspective poses a dual pedagogical challenge for teacher education. The first resides in the social change objectives of environmental education which seek a transformation from “business as usual” approaches to development of ecologically sustainable approaches. As a result, environmental education requires its practitioners to adopt pedagogical approaches which are markedly different from traditional teaching styles. These include interdisciplinary, problematizing knowledge and values, the active investigation of local issues, and the development of a willingness and skills to participate in environmental protection and improvement. These approaches need to be modeled in teacher education programmes. The second challenge involves the practice of professional development experiences and processes that can introduce teachers to the transformative nature of environmental education and empower them to be active, critically-reflective practitioners in their chosen profession. Robottom describes such a process as the antithesis to the “technocratic paradigm” of competency based training that may flow from an uncritical adoption of the competencies we have recommended. He has proposed five pedagogical principles for teacher education practice in environmental education to address these two challenges.
a) Teacher education in environmental education should be *participatory and practice-based*. This means that teacher education programmes should be based upon an epistemology of constructed knowledge which regards its curriculum development and teaching activities in terms of the processes of learning that are required to construct knowledge through the filter of experience. This can be achieved by grounding learning experiences at university in student reflection on their teaching practices and experiences. This will involve course designs and teaching strategies in which student teachers analyze the relationships between their personal beliefs about society, the environment and education, their preferred educational goals and teaching practices, the syllabuses and resources with which they must work, and influences of different school contexts. Working actively with others in identifying and resolving the tensions and contradictions between such variables in the teaching process can provide the reflection skills necessary for solving pedagogical problems through articulated theories of action.

b) Teacher education in environmental education should be *enquiry-based* in order to encourage students to adopt a research stance towards the development of their curriculum planning and teaching skills. This will enable current practices in environmental education and schooling, such as ways of organizing pupils and knowledge for instruction and the resources and teaching strategies that are used, to be regarded as problematic, as open to self and peer analysis and critique, and as having the potential for improvement through participant research.

c) Teacher education in environmental education should involve an *ideological critique* of the environmental and educational values and assumptions that inform environmental education policies, resources and practices. In exposing the interests that are served by alternative orientations and emphases in environmental education, student teachers can develop skills for reflecting upon the interests served by their own professional beliefs and practices, and be empowered to make appropriate changes to achieve the environmental education objectives they favour.

d) Teacher education in environmental education should be *community-based* and involve participants in the active investigation and amelioration of the real world problems of relevance to the communities in which they teach. To encourage pupils to be actively involved in solving real world problems as part of an environmental education curriculum, teachers need
Learning for a sustainable environment

to have had first-hand experience themselves as active members of community organizations working to transform society towards more sustainable alternatives. This means that action research and community problem solving skills need to be practiced (as well as taught about) in teacher education programmes.

e) Teacher education in environmental education should be collaborative because working collaboratively with colleagues makes it easier to recognize the personal and institutional influences that may constrain transformative practices in environmental education. Collective action is also usually more productive than individual efforts in controlling such influences and developing strategies and skills to make improvements in environmental education.

Robottom (1987b, p. 80) quotes from a University of Ulster in-service programme handbook to describe the rationale behind such an approach to teacher education pedagogy:

(This approach) implies that understanding (of subject, of method, of students; of intentions, values relationships; of context etc.) is not separated from practice (and knowledge and understanding of it, in turn). Simply put, teachers on the program are invited to identify areas of professional concern (for example, specific curriculum initiatives, classroom practices, organizational arrangements and procedures etc.), and, through a critical scrutiny of their nature (practical and theoretical), to try to bring about some practical improvement. Underlying such an approach is the belief in the need for a critical community of practitioner researchers.

Hart (1990) has explored how the need for this “critical community of practitioner researchers” might be developed by an examination of the concept of “reflective practitioners” who are equipped with skills for “reflection-in-action” (Schon 1983). He argues that this can provide the basis for an “ecological” approach to professional development for environmental education. He argues that the constructivist epistemology and the focus on interdependence (of teaching practices and contexts and between teaching colleagues and their communities) in this approach is philosophically consistent with an ecological world view and, thus, also with the objectives and guiding principles of environmental education. Hart has identified a range of parallels between ecology and educating teachers, environmentally, as reflective practitioners:
A reflection-in-action perspective on teacher education places emphasis on educational aims and consequences, as well as the technical skills of teaching. Teachers [and teacher educators] are encouraged to consider ethical and value-based issues and this facilitates environmental education goals. Teachers [and teacher educators] are also encouraged to contribute to the formulation of policy at classroom, local, and national levels, thus acknowledging the political nature of human interpretations of the ecological process of change.

Teacher education programs based on a reflection-in-action paradigm emphasize a process model of education where teachers [and teacher educators] . . . monitor and evaluate their own practice reflexively. That is, an action research model, a cyclical process in which teacher action – reflection – improved action is seen as a dialectic between theory and practice, much like the principle of reciprocal relationships is viewed in ecology.

A reflection-in-action approach to teacher education would not propose to eliminate or replace educational disciplines but rather to use them to emphasize relationships to the teacher’s own thinking about practice. That is, the traditional subjects, when combined with classroom experiences, would provide a basis on which to develop teachers’ personal theories of action. The associated ecological principle is that of optimization.

Within this new perspective for teacher education, the effective teacher is not one programmes with research (theory) – based answers to many discrete teaching situations. Rather, the reflective teacher [and teacher educator] is one who is able to conceive his/her own teaching in purposeful terms – one who is able to size up a particular teaching situation, choose an appropriate action, judge results in relation to context and original purposes. This concept operationalized is congruent with self-regulation within ecological systems, (Hart 1990, pp. 14-15).

This perspective on teacher education has led to a sustained critique of technical models of educational change in the Asia-Pacific and other parts of the world. As Robottom (1989) has argued, such technical approaches reduce the role of teachers [and, in our case, teacher educators] to that of “passive receivers” of centrally produced curriculum materials” who can be regarded as “technicians” applying the
Learning for a sustainable environment

ideas of their “professionals” (p. 441). Robottom concludes that two key characteristics of environmental education can be enhanced if teacher educators adopt the reflective practice approach to their work (i) the development of skills for critical thinking, self-evaluation and reflection, and (ii) the development of the knowledge, values and action skills of teachers so that they may become active agents in the process of change towards a sustainable environment.

The next chapter describes the “Learning for a Sustainable Environment: Innovations in Teacher Education through Environmental Education Project” which is using this ecological approach to pedagogy and professional development in environmental education, to develop the skills of teacher educators in the Asia-Pacific region.
Chapter Six

LEARNING FOR A SUSTAINABLE ENVIRONMENT: INNOVATIONS IN TEACHER EDUCATION THROUGH ENVIRONMENTAL EDUCATION

The Learning for a Sustainable Environment – Innovations in Teacher Education Project began in 1994 and is still in the development stages. The project is a joint initiative of UNESCO’s Asia-Pacific Centre of Educational Innovation for Development and Griffith University in Australia. The joint project directors are Dr. Rupert Maclean, the Chief of ACEID, and Dr. John Fien, the Deputy Dean of the Faculty of Environmental Sciences of Griffith University. The project is a long term one which has received Stage 1 funding from the Australian Government and from ACEID.

The primary goal of the project is to assist teacher educators in the Asia-Pacific region to include the educational purposes and innovative teaching and learning strategies of environmental education in their programmes. The project seeks to achieve this goal by expanding the range of innovative practices used in teacher education programmes in the Asia-Pacific region by introducing teachers and teachers-in-training to the conceptual understandings, curriculum planning skills and teaching methodologies of environmental education.

This will be done by the development of a network of teacher educators in the region who are willing to share in the development of carefully researched and evaluated, and culturally sensitive, workshop modules for use in both pre-service and in-service teacher education programmes. These modules will be accompanied by train-the-trainer programmes, which will assist teacher educators to adapt them in accordance with local needs and to prepare action research case studies of their use of the materials and their own continuing professional development.

This project was established following ACEID’s decision to develop an implementation plan for Recommendation 1 of the seminar, “Environmental Education and Teacher Education in Asia and the Pacific,” held at the National Institute for Educational Research (NIER), Tokyo, 20 October-5 November, 1993. This recommendation called for ACEID to develop a three-stage project to promote the development of environmental education in the Asia-Pacific region through:
Stage 1 Development of prototype teacher education materials for EE;
Stage 2 Trial and revision in representative countries in the region; and
Stage 3 Region-wide implementation.

This recommendation was in accord with the focus on competencies for the environmentally educated teacher identified at the "UNESCO Asia-Pacific Regional Seminar on Overcoming the Barriers to Environmental Education through Teacher Education" held at Griffith University in Brisbane from 4-9 July 1993.

The recommendation of the Tokyo seminar was adopted by the 6-9 December 1993 SEAMEO-UNESCO sub-regional conference on environmental education and secondary teacher education held in Penang, Malaysia. This conference emphasized the importance of Stage 1 of the action plan as a way of ensuring that the project serves regional needs by being culturally sensitive, and that it has a solid professional development and networking foundation.

As a result, the project particularly focuses upon the professional competencies of the environmental educator (Set II), with the competencies of the environmentally educated person (Set I) being developed at a later stage. This is because the delegates to these three meetings identified a particular need in the region to support teacher educators and teacher education programmes in the areas of curriculum planning and pedagogical approaches so that their graduates might be better able to achieve the objectives of environmental education with their own classes. This, in effect, was a call for a professional development programme for teacher educators.

The Australian government has provided grants to UNESCO-ACEID to assist in the development of the first and second stages of this project in 1994 and 1995, with UNESCO-ACEID providing the balance of the funds.

The project strategy is based upon the development of a network of teacher educators in the region who will share in the writing of carefully researched and evaluated, and culturally sensitive, workshop modules for use in pre- and in-service teacher education programmes. These modules will be accompanied by a dissemination programme which will assist teacher educators to critique and adapt them in accordance with local needs and to prepare action research case studies of their use of the materials and their own continuing professional development.

Thus, the project seeks to create a spiraling network of innovative teacher education practices and practitioners in environmental education. This will be
Innovations in teacher education through environmental education

achieved by providing teacher educators with prototype materials that have been found useful in one country, and which have then been made available to colleagues and institutions in other parts of the region for review, adaptation and trial. Participants in this process will be encouraged to write case studies of their experiences and to share them (and copies of their revised materials) with other teacher educators in the region.

The purpose of this professional development process for teacher educators is to assist them to incorporate into their programmes the knowledge and skills which can help teachers to introduce and improve environmental education in their classroom. The project has two ancillary benefits. First, it is hoped that the promotion of the innovative teaching strategies of environmental education may also improve the quality of learning in many other areas of the curriculum. Second, the active involvement of teacher educators in action research may help to enhance the research culture in teacher education in the region.

The project is being developed in three stages, with teacher educators in a small number of countries joining the project at each stage. Stage 1 countries include: Fiji, Philippines, Hong Kong, Papua New Guinea, New Zealand and Australia. It is proposed that other countries such as Japan, India, Malaysia, Thailand, Viet Nam and Indonesia will join in Stage 2.

The guiding principles for the project were established by a planning meeting in July 1994 attended by teacher educators who had attended one of the 1993 consultation seminars. These participants developed two sets of principles to guide the development of the project. The first set of principles relates to the characteristics of environmental education and the implications they have for the project. The second set relates to the rationale and objectives of the project in the light of the issues related to curriculum development professional development and research, which have been discussed in the first part of this paper.

**Principles related to environmental education**

- Environmental education involves participatory processes which should be reflected in the nature of the project and the pedagogues to be promoted in teacher education.

- Environmental education is interdisciplinary and focuses on the interaction between environmental quality and development issues. Hence, in teacher education, the relevant biophysical, economic and other social, cultural
Learning for a sustainable environment

and political aspects of environmental issues should be recognized and investigated.

♦ Environmental education is responsive to local contexts. This means that local environmental questions, issues and problems should provide a focus for the development of environmental education projects. This means that materials produced in one country will need to be adapted by others, in response to local cultural and educational requirements.

♦ Environmental education involves a range of innovator teaching and learning strategies which can inform the development and improvement of teacher education.

♦ There are opportunities for environmental education to be taught through all subjects in the curriculum. Thus, environmental education is relevant to all aspects of the teacher education curriculum, including foundation studies, content studies and applied curriculum studies.

Principles related to professional development

♦ The project’s emphasis should be on personal and professional development of teacher educators, rather than on the production of resources.

♦ Collegial and collaborative approaches underlie successful professional development. Hence, a system of critical friends should be established to review and trial early drafts of all prototype materials and to advise on their development.

♦ Active participation and critical reflection are essential components of professional development. Participation in these workshops will provide such opportunities and assist teacher educators to:
  - Clarify the strengths and limitations of their present practice; and
  - Establish their personal ownership of the project through the review, critique, revision and adaptation of curriculum resources.

♦ The cultural and educational diversity in the region requires a framework for professional and curriculum/resource development which gives direction to participants but is flexible enough to accommodate local concerns and priorities.
Innovations in teacher education through environmental education

- Existing networks in the region must be used and strengthened to facilitate the diffusion and dissemination of the innovative approaches developed by participants.

- The prime focus of the evaluation of the project will be on the teacher educators and the quality of their learning, in relation to their use of innovatory teaching and learning strategies.

These guiding principles for the project are reflected in the working principles for the development of modules provided to Stage 1 authors. These principles are recommended to all who wish to participate in the project as a guide to the writing of modules. These principles include:

- All modules are to be written by authors for their own use in a sufficiently flexible way that they can be shared with colleagues in their own country and other parts of the region.

- All modules are to be written in a workshop format.

- Workshop should be based on participant centred experiential learning processes and involve direct and active personal experience in order to identify, develop and reinforce new skills.

- Modules should flexible in the following ways:
  - They should be open and flexible enough to allow for culturally responsive adaptation;
  - They should be self-standing, with cross-references to show themes;
  - There should be no restrictive sequence to modules;
  - They should allow for both pre- and in-service contexts;
  - They should allow adaptation for primary, secondary and informal contexts; and
  - They should allow for facilitator-driven, co-operative and independent phases during the workshop.

- Modules should be organized according to those innovative teaching strategies through which environmental concepts, skills and values can best be developed.

- The modules should not be seen as a finished product but should reflect a dynamic resource that is constantly evolving as it is analyzed, adapted,
trialed and evaluated. This reflects a concern for professional development, as opposed to product development, for the open-ended resource would allow for possible addition of local and/or self-developed materials and adaptation.

A common format has been provided to Stage 1 participants and a network of critical friends for each author established from the attendance lists of the three 1993 seminars. Topics of Stage 1 modules include:

- The Nature and Objectives of Environmental Education;
- Whole School Approaches to Curriculum Planning in Environmental Education;
- Assessment of Learning in Environmental Education;
- Teaching Ecological Concepts and Principles through Systematic Analysis of Local Environments;
- Using the Environment as a Resource for Learning;
- Issue or Enquiry-based Teaching for the Environment
- Values Education and Environmental Ethics;
- Role Play, Simulation and Games in Environmental Education;
- Action Research as a Teaching Strategy in Schools and Communities; and
- Taking an Action Research Approach to Teaching in Environmental Education.

A review meeting in late 1996 brought together participants from Stages 1 and 2 of the project. The meeting enabled the growth of relationships between authors, critical friends and new members of the project. In addition, new members of the network were introduced to the materials that have been prepared and to the action research process through which their analysis, adaptation, trial and evaluation of the materials can be documented and shared with teacher educators in other parts of the region.

It is the role of the Project Office at Griffith University to prepare guides for all persons and institutions participating in Stages 1 and 2 of the project. Advice to Stage 1 authors and critical friends relates to the writing and critique of modules. Advice to Stage 2 participants seeks to enable them to write action research-based case studies of the factors that influenced their evaluation, revision, adaptation and re-writing of the Stage 1 modules. The case studies will also address the issues involved in using materials in teacher education. A synthesis of case study reports will be
used for preparing guidelines in cross-cultural settings. A conference will be held at the end of Stage 2 to expand the circle of participants, and present the research and case studies.

In Stage 3 of the project another group of countries will be introduced to the network. It is hoped that participants from Stage 2 countries will take on the role of authors and share their modules with Stage 1 and 3 participants, thus maintaining the focus of creating a spiraling network of innovative teacher education practices and practitioners in environmental education in the Asia-Pacific region. It is anticipated that Stage 3 will also involve: providing a training programme to help disseminate the processes of the project both within member countries of the network and to other countries in the region; preparing evaluation reports on the implementation; conducting a regional seminar to review the processes and products of the project; and publishing and disseminating the results of the project for other UNESCO regions.

Despite the practitioner focus of the project, it is recognized that the support of policy makers is important, especially in those countries in the Asia-Pacific region in which teacher education curricula are centrally determined. Several strategies have been developed to address this need, including letters and newsletters on the project from UNESCO-ACEID to all countries in the Asia-Pacific Region and ACEID Associated Centres with information about the project. This book is a part of this process also, as it provides guidance for teacher education institutions and policy makers in the region on ways of integrating environmental education into teacher education programmes.

**Conclusion**

This project draws upon Hart’s work (outlined in Chapter 5) to show how teacher educators may ground their work in an approach which integrates curriculum development, professional development and reflective practitioner-based research to promote environmental education in their teacher education programmes. It is the hope of all those involved in the *Learning for a Sustainable Environment - innovations in Teacher Education Project* that the emphasis on the three related elements of professional development, curriculum development and practitioner research will contribute to the success of a viable international project. Perhaps, then, as teacher educators around the world, we will be able to stand with those who have refused to “stand aloof from the decisions about how and whether life will be lived in the twenty-first century” (Orr 1992, p. 145).
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Learning for a sustainable environment


Learning for a sustainable environment


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79
Appendix

COMPETENCIES OF THE ENVIRONMENTALLY EDUCATED TEACHER

(Source: Wilke, Peyton and Hungerford 1987)

Foundational Competencies in Professional Education

The effective E.E. teacher should be able to . . .

1. Apply a knowledge of educational philosophy to the selection (and/or development of curricular programmes and strategies to achieve both general education and E.E. goals. (It is important that all educators be aware of the philosophical basis for education in their own society. Environmental education goals and methods should be evaluated in light of such philosophies as Experimentalism (Dewey) or Reconstructionism (Brammel). Many accepted goals of general education supported by such philosophies are entirely consistent with E.E. goals. General education materials and methods may sometimes need to be merely “environmentalized” to achieve the goals of each).

2. Utilize current theories of moral reasoning in selecting, developing and/or implementing E.E. curricula which will effectively achieve accepted goals of E.E. with selected receiver groups. (Included in this category of “moral reasoning” are not only theories of moral development such as Kohlberg’s, but theories of valuing processes as well. E.E. teachers should be competent to assess the developmental readiness of receivers when dealing with attitudes and processes in the affective domain, and to utilize appropriate strategies to allow receivers to recognize the role of values in environmental decision making, clarify value positions, and understand the valuing process).

3. Utilize current theories of knowledge/attitude/behavior relationships in selecting, developing and/or implementing a balanced curriculum which maximizes the probability of desired behavior changes in receivers.
(Environmental educators often assume linear relationships among ecological knowledge, positive environmental attitudes, and environmentally ethical behavior. Current research indicates that such may not be the case. E.E. teachers must balance their curriculum in view of the roles of various categories of knowledge (e.g., ecological knowledge vs. trade-off costs), experiences, and locus of control (internal or external) in leading to desired behavioral outcomes).

4. Utilize current theories of learning (e.g., Piaget, Bruner, Gagne) in selecting, developing, and/or implementing curricular materials and teaching strategies to effectively achieve E.E. goals with selected receiver groups. (The nature of many E.E. goals is problem solving. Learning theory has much to offer in guiding the selection of materials, and strategies for specific receiver age levels may be effective when theories of learning development (e.g., Piaget) are considered. A pragmatic approach to this body of knowledge would do much to increase the effectiveness of E.E. teachers).

5. Apply the theory of transfer of learning in selecting, developing or implementing curricular materials and strategies to ensure that learned knowledge, attitudes, and cognitive skills will be transferred to life style decision-making by receivers.

(The ultimate goal of E.E. is to produce environmentally literate citizens who are willing and capable of taking positive environmental actions in their lives. Too often, educators fail to teach for the transfer of knowledge, attitudes and cognitive processes by receivers (for use both within and outside the formal classroom).

6. Select effective instructional methodologies which are appropriate for desired cognitive and affective outcomes, receiver characteristics, and available facilities (e.g., time, money, personnel).

7. Effectively implement the following methodologies to achieve E.E. goals:
   a) Outdoor education methods;
   b) Affective education methods (e.g., values clarification, Bank’s inquiry model, moral dilemma model);
   c) Simulation games (including role playing);
   d) Case study methods;
   e) Community resource use (ecological, issue related, human resources);
Learning for a sustainable environment

f) Methods of autonomous student and/or group investigation, evaluation and action planning for resolving environmental issues; and
g) Appropriate teacher behavior while handling controversial environmental issues.

8. Develop and use effective means of planning for instruction.
9. Effectively infuse appropriate E.E. curricula and methods into all disciplines to which the teacher is assigned.
10. Effectively evaluate E.E. curricula and methods achievement with receivers in both cognitive and affective domains.

Competencies in Environmental Education Content

Level I: Ecological foundations

The effective E.E. teacher should be able to . . .

11. Apply a knowledge of ecological foundations to the analysis of environmental issues and identify key ecological principles involved.
12. Apply a knowledge of ecological foundations to predict the ecological consequences of alternative solutions to environmental problems.
13. Be sufficiently literate in ecology to identify, select, and interpret appropriate sources of scientific information in a continuing effort to investigate, evaluate and find solutions for environmental problems.
14. Communicate and apply in an educational context, the major concepts in ecology.

Level II: Conceptual awareness

The effective E.E. teacher should be able to select, develop and/or implement curricular materials which will effectively make receivers aware of...

15. How man’s cultural activities (e.g., religious, economic, political, social, etc.) influence the environment from an ecological perspective.
16. How individual behaviors impact on the environment from an ecological perspective.
Appendix

17. A wide variety of local, regional, national and international environmental issues and the ecological and cultural implications of these issues.
18. The viable alternative solutions available for remediating discrete environmental issues and the ecological and cultural implications of these alternative solutions.
19. The need for environmental issue investigation and evaluation as a prerequisite to sound decision making.
20. The roles played by differing human values in environmental issues and the need for personal values clarification as an integral part of environmental decision making.
21. The need for responsible citizenship action (e.g., persuasion, consumerism, legal action, political action, ecomanagement) in the remediation of environmental issues.

Level III: Investigation and evaluation

*The effective E.E. teacher should be competent to investigate environmental issues and evaluate alternative solutions and to develop, select and/or implement curricular materials and strategies which will develop similar competencies in receivers, including . . .*

22. The knowledge and skills needed to identify and investigate issues (using both primary and secondary sources of information and to synthesize the data gathered.)
23. The ability to analyze environmental issues and the associated value perspectives with respect to their ecological and cultural implications.
24. The ability to identify alternative solutions for discrete issues and the value perspectives associated with these solutions.
25. The ability to autonomously evaluate alternative solutions and associated value perspectives for discrete environmental issues with respect to their cultural and ecological implications.
26. The ability to identify and clarify their own value positions related to discrete environmental issues and their associated solutions.
27. The ability to evaluate, clarify, and change their own value positions in light of new information.
Learning for a sustainable environment

Level IV: Environmental action skills

The effective E.E. teacher should be competent to take positive environmental action for the purpose of achieving and/or maintaining a dynamic equilibrium between quality of life and the quality of environment, and to develop, select, and/or implement curricular materials and strategies to develop similar competencies in receivers to take individual or group action when appropriate (i.e., persuasion, consumerism, political action, legal action, ecomanagement, or combinations of these action categories).