

Education for Sustainability

Tela



Education for Sustainability:

Reorientating Australian schools
for a sustainable future

issue



John Fien

Director, Griffith University EcoCentre

June 2001

Jointly sponsored by:

The Australian Conservation Foundation

**The Australian Association
for Environmental Education**

The Trust for Young Australians

Contents

Abstract PAGE 1

1. Education for sustainability: a force for the future PAGE 3

2. Reorienting schools for sustainability PAGE 15

3. Recommendations for the education system, schools and teachers PAGE 29

Further reading PAGE 33

Abstract

Schools are key places where young people acquire the knowledge, values and skills to be informed and contributing members of society. The family, religious institutions, the law, the media and peers also play major roles in socialisation, but schooling is the primary process through which a common set of norms and goals is sought by a society.

Education for sustainability involves approaches to teaching and learning that integrate goals for conservation, social justice, appropriate development and democracy into a vision and a mission of personal and social change. It seeks to develop the kinds of civic virtues and skills that can empower all citizens and, through them our social institutions, to play leading roles in the transition to sustainability. As such, education for sustainability encompasses a vision for society that is not only ecologically sustainable but one which is socially, economically and politically sustainable as well. This role of education in the development of civil society poses important questions for those who wish to teach for a just and sustainable future. While it builds upon many innovative programs currently under way in Australia, it also calls into question many of the ways in which we have sought to educate our young people.

PAGE I

Education for sustainability encompasses a vision for society that is not only ecologically but also socially, economically and politically sustainable.

This paper in the *Tela* series canvasses ways in which learning experiences in Australian schools might be re-oriented to support the social, ecological, economic and political goals of sustainability. A brief history of environmental education in Australia reviews what has been achieved and what has been neglected over the past 30 years. Key features of a curriculum for sustainability are explored, as well as the processes of educational reform that may be necessary. The principles underlying the reforms outlined are, to varying extents, relevant to all levels of education, but need to be interpreted and focused for action in education systems and local community contexts.

An international survey, which included Australian students, indicates that student levels of awareness of key concepts for sustainability are low, with few able to correctly define concepts that underpin sustainability such as the precautionary principle and sustainable development. Despite this lack of awareness, protecting the environment was the most

Acknowledgements

I deeply appreciate the scholarly and editorial advice and support of David Yencken, Judith Aitchison and the three referees who, together, have helped shape both the form and substance of the ideas that are discussed.

important issue for students. They also expressed a strong desire to have more frequent discussions of environmental topics in class than they were currently having. The need for better opportunities identified by this survey supports the need for a whole-of-school, cross-curriculum approach to education for sustainability.

Specifically it is recommended that educational systems should:

affirm the role of education in building civil society in all educational institutions supported by whole-of government commitment to sustainable development;

promote new educational policies, programmes and practice, including:

- educational thinking and practice based upon interdisciplinary curricula, a problem-solving focus and outcomes-oriented teaching strategies;
- the introduction of a core programme of studies of sustainability in Years 11 and 12 to include: a) creating a new interdisciplinary subject on sustainable futures and b) integrating principles and practices of sustainability into all relevant subjects and teaching strategies; and
- support for teaching and learning experiences that encourage students to explore questions, issues and problems of sustainability in contexts relevant to them and their communities, from local to global;

transform curriculum support systems by:

- encouraging increased devolution of curriculum development and assessment to schools and teachers (based upon broad framework syllabus guidelines at all year levels, including Years 11 and 12); and
- giving priority to teacher education reform as urgently recommended by the UNESCO-UNEP International Environmental Education Programme to infuse awareness and understanding of sustainability concepts and practices into initial pre-service and continuing in-service professional development.

1. Education for sustainability: a force for the future

It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future. Indeed, education will shape the world of tomorrow. Progress increasingly depends upon the products of educated minds: upon research, invention, innovation and adaptation. Of course, educated minds and instincts are needed not only in laboratories and research institutes, but in every walk of life. Indeed, access to education is the sine qua non for effective participation in the life of the modern world at all levels. Education, to be certain, is not the whole answer to every problem. But education, in its broadest sense, must be a vital part of all efforts to imagine and create new relations among people and to foster greater respect for the needs of the environment.

UNESCO, 1997, p. 15

Australia has a long history of educating for sustainability going back over 40,000 years. Our Aboriginal peoples established a human and natural ecology at one with each other. The land was respected and loved as a mother and there was a oneness between the land and all the creatures, including the people, who inhabit it. The Aboriginal people had, and still have, elaborate systems for codifying their knowledge of the land, its cycles, the need to respect it, and the management practices that allowed them to use the land and its resources in a sustainable way. This knowledge has been passed down through the generations through stories, dance, ceremonies and the establishment of a network of sacred places.

Upon European settlement, this Aboriginal system of education was quickly supplanted by a pioneering culture and its belief that the land was valuable only in so far as it was productive. The consequent disregard for the country throughout the nineteenth and much of the twentieth centuries meant that many mistakes were made. The results have been catalogued in the many national, state and local government reports on the state of the environment that have been published in recent years.

Over the past two decades, many Australians have become concerned about the environment. Rising concerns about the unsustainable rate of resource consumption and the degradation of the environment have helped many of us to become increasingly aware of the need for changes in our lifestyle choices and in national and global patterns of development and trade. In 1997, a UNESCO paper concluded that:

Most people in the world today have an immediate and intuitive sense of the urgent need to build a sustainable future. They may not be able to precisely define 'sustainable development' or

'sustainability' – indeed, even experts debate that issue – but they clearly sense the danger and the need for informed action. They smell the problem in the air; they taste it in their water; they see it in more congested living spaces and blemished landscapes; they read about it in the newspapers and hear about it on radio and television (p.7).

The central concern of this Tela paper is the implication of this awareness for the nation's schools. There is general agreement that education will play an important role in motivating and empowering people to participate in working towards a sustainable future. However, the changes necessary for achieving this are far-reaching, and have been likened to changing our entire worldview.

The central concern of this Tela paper is the implication for the nation's schools of growing awareness of the urgent need to build a sustainable future.

If schools are to fulfil their potential and help the transformation towards a sustainable future, teachers, curriculum developers and school administrators must come to a deep consciousness of the global realities that beset humanity, appreciate the imperatives of reorienting education systems and curricula towards a future that can be sustainable, and develop and promote a range of curriculum and teaching approaches that are committed, ethical and effective in empowering young people to dedicate their lives to sustaining their, and our, common future.

Pillars of Sustainability

The pillars of sustainability are grounded in four interdependent systems:

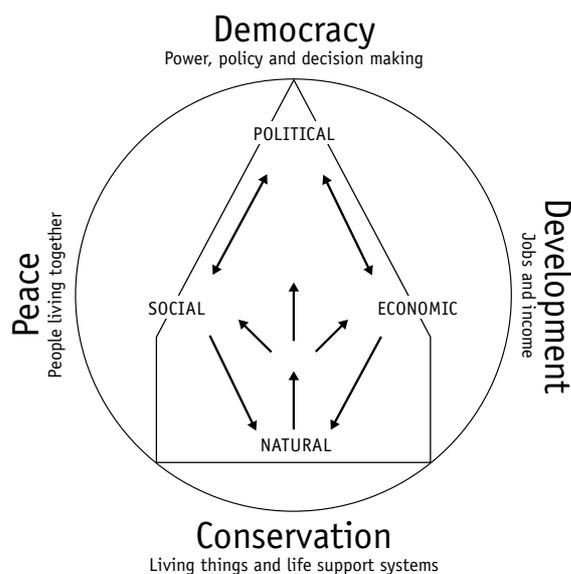
- Biophysical systems which provide the life support systems for all life, human and non-human;
- Economic systems which provide a continuing means of livelihood (jobs and money) for people;
- Social and cultural systems which provide ways for people to live together peacefully, equitably and with respect for human rights and dignity; and

- Political systems through which power is exercised fairly and democratically to make decisions about the way social and economic systems use the biophysical environment.

This holistic view supports four inter-related principles for sustainable living (Figure 1):

- *Conservation* to ensure that natural systems can continue to provide life support systems for all living things, including the resources that sustain the economic system.
- *Peace and Equity* to encourage people to live cooperatively and in harmony with each other and have their basic needs satisfied in a fair and equitable way.
- *Appropriate Development* to ensure that people can support themselves in a long-term way. Inappropriate development ignores the links between the economy and the other systems in the environment.
- *Democracy* to ensure that people have a fair and equal say over how natural, social and economic systems should be managed.

Figure 1: A systemic or holistic view of sustainability
(after R. O'Donoghue, Natal Parks Board)



As a result, education for sustainability is broader and, perhaps, more challenging than the concept of environmental education that was introduced in Australia in the 1970s. Education for sustainability integrates ecological thinking and the wise use of natural resources - conservation - with the equally important concerns of social, economic and political sustainability. The aim of education for sustainability is to develop skills that can enable all citizens and, through them, our social institutions, to play a role in the transition to sustainability. As such, it encompasses a vision for society that is not only ecologically sustainable but also socially, economically, and politically sustainable.

Education for sustainability is broader and more challenging than the older concept of environmental education.

Consequently, the process of reorienting education towards sustainability is a broader and more pervasive task than that of revising syllabuses and devising new teaching and learning materials that incorporate principles and examples of sustainability. Reorienting education towards sustainability requires ongoing support for many of the innovative educational reforms currently underway in Australia.

Environmental education in Australia

Support for environmental education developed in many parts of the world during the 1970s. The first journal of environmental education was published in the United States in 1969 and a national Environmental Education Act declared there in 1970. IUCN issued the first internationally agreed definition of environmental education at a conference in Nevada in 1970 and, in 1972, the United Nations Conference on the Human Environment (Habitat I) in Stockholm agreed to establish a joint UNESCO-UNEP International Environmental Education Programme. In Australia, the first environmental education syllabus was also issued in 1972, the 'Man (later 'People') and the Environment' geography syllabus in Queensland.

A UNESCO-UNEP sponsored conference in Belgrade in 1974 initiated a global series of national and regional meetings on environmental education which resulted in an

Intergovernmental Conference on Environmental Education in Tbilisi in 1977. The set of goals, aims, objectives and guiding principles agreed at that meeting (the 'Tbilisi Declaration') has proven not only to be enduring but also to be a major catalyst to national education policy processes throughout the world. In Australia, for example, they shaped the national environmental education project of the Curriculum Development Centre in the 1970s and they have been incorporated into the environmental education policies and guidelines in all states and territories.

Unfortunately, the objectives of encouraging critical thinking, values analysis and active citizenship in environmental contexts enshrined in these documents counted for little in mainstream education policy and practice in Australia during this first wave of environmental education in the 1970s. The evaluation of the Curriculum Development Centre project found that such objectives had been 'diluted' and, in some cases, 'deleted' from the curriculum because environmental education had been seen as the prerogative of subjects such as science and geography, where social and political values were not normally critically examined. A number of research studies throughout the 1980s and 1990s (eg Spork 1992) have supported this conclusion.

The most significant reform has been establishing Studies of Society and the Environment as a compulsory area of learning for all students up to Year 10 across the country.

However, some changes in educational priorities are currently under way. For example, Australian science educators are recognised as the international leaders of the 'science for all' movement which attempts to explore the educational implications of the 'public understanding of science'. The Australian Education Council, which comprises federal, State and Territory government ministers of education, in 1989, included the need to develop students' "understanding of and concern for balanced development and global environment" within 10 common and agreed national goals for Australian schooling. These goals were updated in 1999 to include the goals that students should develop "the capacity to exercise judgement and responsibility in matters of morality, ethics and social justice" and "an

understanding of, and concern for, stewardship of the natural environment, and the knowledge and skills to contribute to ecologically sustainable development" (MCEETYA 1999). The collaborative national curriculum process that followed established a new interdisciplinary area of learning called Studies of Society and the Environment and incorporated an environmental education perspective in science, technology, health and physical education. As a result, for example, the joint Commonwealth-State document, *A Statement on Science for Australian Schools* (AEC 1994), outlined goals for science education that were different from the way science had traditionally been taught in schools. These can be seen to complement learning areas such as Studies of Society and Environment, as they aim to develop science students who:

- understand and appreciate the evolutionary nature of scientific knowledge and the nature of science as a human endeavour, its history, relationship with other endeavours and contribution to society, and
- can consider the ethics of the impacts on people and the environment of the processes and likely products of science (cited in Gough 1997).

Perhaps the most significant reform has been establishing Studies of Society and the Environment as a compulsory area of learning for all students up to Year 10 across the country. Integrating social and environmental education has the potential to embed principles of sustainability in the curriculum of all students as the three core values in this learning area are sustainable development, justice and democracy. Unfortunately, there is no requirement that studies related to these core values extend into Years 11 and 12.

Does it matter to me?

Should I do something about it?

How can I do something about it?

What will I do?

These initiatives have taken place at the same time as a major rethinking of the contribution of education to sustainability internationally (see Orr 1992, Huckle and Sterling 1996, UNESCO 1997, McKeown 2000). As a result, a 'second wave' of environmental education has

been developing in Australia and elsewhere. Focusing on the relationship between education and sustainability, this 'second wave' draws on the Agenda 21 report of the 1992 United Nations Conference on Environment and Development (UNCED), the Earth Summit. Agenda 21 devoted a whole chapter to the role of environmental education in relation to sustainability, arguing that:

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.

Directed towards such ends, education has a pivotal role to play in both building a supportive social context for sustainability and in empowering citizens to influence policy makers to hasten the transition towards sustainability. Indeed, without such education, even the most enlightened legislation, cleanest technology and most sophisticated research will not achieve the long-term goal of a sustainable future.

Environment Australia has identified four goals to guide the development of education for sustainability:

- Awareness raising - 'Does it matter to me?'
- Shaping of values - 'Should I do something about it?'
- Developing knowledge and skills - 'How can I do something about it?'
- Making decisions and taking action - 'What will I do?'

These are most important goals if the important social transformation roles of schools, which were lost in the first wave of environmental education in Australia in the 1970s, are to be advanced through the second wave we know as education for sustainability.

A Case for Change

Proof that changes in education are needed is only too evident in the results of two recent studies. In the first, conducted for the Australian Science and Technology Council, more than

half the 16 to 24 year olds surveyed expressed little hope for a sustainable future. When asked about living conditions in 2010, more than half said that they believed that the natural environment, the gap between rich and poor, and crime and violence would be worse than now. Summarising this research, Eckersley (1999) stated that:

The future most young Australians want is neither the future they expect, nor the future they are promised. Most do not expect life in Australia to be better in 2010. They see a society driven by greed; they want one driven by generosity. Their dreams for Australia are of a society that places less emphasis on the individual, material wealth and competition and more on community and family, the environment and cooperation (p. 77)

Similarly, the Australian results of a study of the environmental knowledge and attitudes of young people in the Asia-Pacific region (Yencken, Fien and Sykes 2000) found that 89% of the 5500 16-17 year olds in Melbourne and Brisbane who participated in the study expressed a preference for environmental rather than technological belief systems. Thus, when asked to rank a set of goals for Australia, the issues of peace, environment and equity that underpin sustainability were ranked most highly (Table 1). These priorities for Australia are different from the views of adults who rank unemployment and the economy more highly in similar polls.

Table 1: Most important goals for Australia as chosen by 16-17 year old students in Melbourne and Brisbane (ranking out of 11 options)

Issue	Number 1 ranking (%)	Selected in first four rankings (%)
Preventing war and nuclear threats	21	58
Protecting the environment	19	77
Creating a fairer and more humane society	18	49
Reducing unemployment	11	50

Source: Fien, Yencken, Connell and Sykes (2001)

However, these positive beliefs were not supported by a sound awareness and knowledge of sustainability or a strong willingness or ability to act for a sustainable future. For example, the Australian young people reported high levels of awareness of topics frequently in the media and school syllabuses such as the greenhouse effect, ozone layer, renewable resources and ecology. However, only 54% or less reported ever having heard of inter-generational equity, the precautionary principle, biodiversity, sustainable development and carrying capacity, concepts that are central to an understanding of sustainability (see Table 2).

Table 2: Familiarity with environmental concepts

Concepts	% of students who say they have heard of the concept
Greenhouse effect	99
Ozone layer	99
Renewable resources	94
Ecology	91
Carbon Cycle	66
Sustainable development	54
Carrying Capacity	50
Biodiversity	49
Intergenerational Equity	35
Precautionary principle	22

Source: Fien, Yencken, Connell and Sykes (2001)

With levels of awareness so low, it is not surprising that, when asked to define the concepts, the students' knowledge was only moderate, with the largest number of the students answering only half of the questions correctly (see Table 3). Out of a maximum score of 11, the average student score was 5.5 with few able to correctly define those concepts that underpin sustainability such as precautionary principle and sustainable development.

This is clear evidence that schools are not currently providing students with knowledge or understanding of the key concepts that underlie sustainable development.

Table 3: Knowledge of environmental concepts

Correct Answers	% of students*
Nil to 3 correct	15
4 to 6 correct	42
7 to 9 correct	35
10 or 11 correct	6

*Numbers do not total 100% due to rounding.

Source: Fien, Yencken, Connell and Sykes (2001)

Despite these low scores, the majority of students rated their desire to be involved in improving the environment as 'medium' or 'strong' (72%). However, when they were asked to rate their level of skills and knowledge to bring about environmental improvements (no matter how small), their scores were substantially lower. Indeed, 74% of the students rated their skills for improving the environment as 'low' or 'moderate'.

There was a distinct lack of political literacy and environmental activism among the students as well. For example, while many reported individual or household behaviours such as deciding to reuse or recycle something rather than throw it away (73%) and choosing household products that are better for the environment (60%), civic activities (eg writing a letter, signing a petition or making a report or complaint about an environmental issue) and community projects (eg taking part in a clean-up or anti-litter campaign or tree-planting) were far less popular. When asked why they felt unable to do more for the environment, 45% stated that they believed their actions would make no difference.

As part of this study, six focus groups of 16-17 year old students in Melbourne were asked whether there were any local citizenship actions, such as writing letters, that they might like to take now or in the future. However, the young people in every one of these groups

indicated overwhelming cynicism about the worth of making such efforts. They stated that they would not know to whom to write and believed that their letters would not get read and, hence, would not make any difference for the environment:

I'm going to keep doing the same things for the environment I'm already doing but I wouldn't go to the extent of signing a petition or writing a letter. It needs too much time and who are you going to write to? What are you going to write about? You'll feel stupid. They won't read it. They wouldn't pay attention to it anyway.

I think that a lot of people feel that even if they do take the time to write a letter or attend a meeting that it's not going to make any difference so what's the point in going to the trouble?

Connell, Fien, Lee, Sykes and Yencken, 1999

In a similar display of powerlessness, these young people said that they did not feel that they could influence other people to do things for the environment - nor did they appear interested in the notion. They suggested that, while it was possible to influence other people, "you would have to be a popular or a powerful person". Some also said that they did not believe that it was appropriate to tell friends about their environmental beliefs because they might think that "you are telling them what they should do". Others felt that it would not be "cool".

This is clear evidence that schools are not currently providing students with knowledge or understanding of the key concepts that underlie sustainable development.

Nevertheless, the majority of students wanted to study more about the environment than their schools allowed. As Table 4 shows, their desired frequency of at least regular (weekly or monthly) classroom discussion of environmental issues far exceeds what schools are currently providing.

Table 4: Current frequency versus desired frequency of classroom discussions of environmental issues

	Current Frequency	Desired Frequency
Brisbane		
- often/regular (%)	30	50
- sometimes (%)	57	41
- never (%)	16	6
Melbourne		
- often/regular (%)	29	55
- sometimes (%)	57	41
- never (%)	17	5

Source: Yencken, Fien and Sykes (2000)

However, reorienting education towards sustainability is not just a question of more studies of sustainable development and environmental issues. It is also a matter of the purpose and form of these studies. These aspects of educating for sustainability are the focus of the next chapter.

2. Reorienting schools for sustainability

The crisis [of unsustainability] cannot be solved by the same kind of education that helped create the problems.... Schools, colleges and universities are part of the problem.

PAGE 15

Orr 1992, p. 83.

When the wide scope of the task of reorienting education towards sustainability is considered, it is difficult not to conclude that much of education needs to be largely fashioned anew.

Knowledge about the earth, its plants and its animals has a prominent place in science, geography and social studies in our schools, as does an understanding of how ecosystems function and the ways people use resources. However, there is a widespread problem with the way that these topics are translated into textbooks and teaching programmes. For the most part, they are compartmentalised into separate, exclusive subject areas called disciplines. Knowledge from different disciplines is rarely integrated and few attempts are made to link the health of people to the health and sustainability of ecosystems, and students are rarely asked to reflect upon the impacts of their activities and those of their families and wider society on the functioning of ecosystems. Cognitive and practical skills for practising sustainability in one's daily life and community, and the values underpinning a sustainable society, are rarely assessed and, therefore, tend to be ignored in crucial education decisions in Australia, and indeed worldwide.

At least three key changes are needed to re-orient education for sustainability.

First, there is a need to change the balance of emphasis in education between reproducing existing social systems and promoting social change. This is the contemporary version of what John Dewey, the early 20th century American philosopher and educator, called the 'reconstructionist' tradition in education. Dewey believed that in many situations it is sufficient to do things according to custom and habit, but in some circumstances new responses are called for. If we are to envisage and instigate new ways of living and acting, we must have the capacity to evaluate and instigate social and environmental change.

Second, the objectives and content themes of syllabuses in all subjects need to be revised so that sustainability is a central concern. This will enable the development of teaching and learning processes that emphasise moral virtues, ethical discernment, learning how to learn, reflection, creativity, civic mindedness, and the motivation and abilities to work with others to help build a sustainable future for human and non-human nature.

Third, reorienting education towards sustainability requires structural reforms in education, including moving away from centralised, mandatory courses and textbooks towards locally relevant learning programmes, new ways of assessing the processes and outcomes of learning, and alternative purposes and approaches for students credentials.

The actions needed to achieve these three changes are discussed below.

I. Developing the capacity to evaluate and instigate social and environmental change

A lack of a whole-of-government commitment to sustainable development has meant that schools have tended to reproduce a 'business as usual' culture of unsustainable lifestyles, inappropriate development strategies and a degraded environment. The problems of soil erosion and salinity, unsustainable forestry, inadequate public transport and industrial pollution are - at the one time - the results or effects of inappropriate development and key causes of community decline. The problems of rural, regional and outer-suburban Australia flow from this nexus of social, economic and ecological problems and have resulted in the political disillusionment felt by so many people in Australia today. Reorienting education towards sustainability recognises the importance of economic viability and productive employment at community, regional and national levels. It should also provide students with the life skills they need to be constructive and active citizens, capable of and committed to contributing to a peaceful, abundant and sustainable future.

A vision of a vibrant civil society is also an essential part of reorienting education towards sustainability, and requires "an unwavering commitment by educational institutions to foster widespread civic competence" (Orr 1992, p. 84). Schools can help build a more sustainable society by helping students to:

- develop criteria for determining what is best to conserve in their cultural, economic and natural heritage;
- discern values and strategies for creating sustainability in their local communities; and
- apply their understandings, so formed, with others, to investigate and address national and global concerns.

Thus, education for sustainability is part of the process of building an informed, concerned and active civil society. This is not social engineering or indoctrination. Nor does it encourage students to adopt only one view of what a sustainable society would be like or undermine their capacities for independent, critical thinking. Rather, the essentially democratic foundations of education for sustainability encourage teachers and students to engage in a "shared speculation" about possible and alternative futures and "reflectively construct and reconstruct" their visions of the future (Huckle 1991, p. 61).

Exploring alternative visions of the future can help young people contribute to local, national and global sustainability by learning how to:

- value diverse ways of knowing;
- appreciate the implications and responsibilities of their places in a complex web of relationships and systems;
- identify with their own cultural heritage and value it as a contribution to the global diversity;
- appreciate the views and experiences of people from other cultures;
- respect democratic approaches to social continuity and change;
- respect the rights of present and future generations and of other species;
- develop and practice vocational knowledge and skills that support not only themselves and their families but also the long-term social and economic well-being of society;
- choose lifestyle habits in the areas of consumption, recreation, transport that conserve natural resources and minimise their social and ecological footprints on the planet; and
- work, individually and with others, to analyse issues and problems, envision and evaluate alternative solutions, and make and enact plans to achieve the futures they prefer.

2. Revising the objectives and themes of syllabuses in all subjects

Achieving such outcomes of education for sustainability calls for a ‘new generation’ of educational thinking and practice.

Science and sustainability

Much contemporary environmental education focuses on science. The natural sciences provide important knowledge of Earth’s systems but, of themselves, do not contribute to sustainable development. Hence, an important aspect of reorienting education towards sustainability will be the development of interdisciplinary curricula which successfully impart scientific and technological knowledge while, simultaneously, emphasising the essentially social, economic and political influences on decisions about how such knowledge is used.

Reorienting education towards sustainability requires a new view of science, an ecologically-focused science, which recognises the interconnectedness of systems, both human and natural.

Reorienting education towards sustainability requires a new view of science, an ecologically-focused science, which recognises the interconnectedness of systems, both human and natural. Many of the assumptions on which science has been based were developed by privileged, often European, males in western societies whose worldviews could not incorporate those of the other gender, or other cultures. Mainstream science has often seen nature as available for exploitation, and that economic growth was imperative for our society. Women’s needs have often been overlooked by science (for example, most new drugs are tested on males, not females, as female hormonal variations make testing more difficult), and knowledge that women traditionally hold has been under-valued (for example, knowledge of food collecting and traditional medicines in non-western cultures). Aboriginal views and uses of science have also been neglected.

These old views of science have contributed to environmental exploitation and have marginalised many people. As many scientists now recognise, young people need to learn

to value global cultural diversity, to value diverse ways of knowing the world, and to respect community-based approaches to social change as part of education for sustainability. This calls for increased attention to the humanities and social sciences in the school curriculum in order to focus on the issues of social justice, ecological sustainability and citizenship. In this regard, the establishment of Studies of Society and the Environment as a Key Learning Area in Australian schools positions Australia at the forefront of international thinking in this area.

Education and sustainability

Education for sustainability is ultimately about education and capacity building and only secondly about environmental problem-solving. Traditionally, environmental education has been justified as a contribution to environmental problem-solving and has often been evaluated according to whether environmental improvements have been achieved or not. However, the citizenship focus of education for sustainability emphasises educational changes and learning as a precursor to solving environmental problems. Of course, it is also desirable for students to solve the environmental problems that concern them, as this can contribute both to sustainability and to a sense of self-esteem and empowerment.

Education for sustainability is ultimately about education and capacity building and only secondly about environmental problem-solving.

Key Concepts and Themes in a Curriculum for Sustainability

Education for sustainability requires learning that is holistic and has a moral base. It needs to be integrated across subjects through focusing on the concepts that underlie sustainable development. A beginning list of such concepts is provided in Figure 2. Increased understanding of concepts such as these can help students appreciate the complexity of life and make informed decisions about present day concerns and alternative scenarios for the future.

Figure 2: A beginning list of sustainable development concepts:

Interdependence:	The relationships of mutual dependence between all elements and lifeforms, including humans, within natural systems.
Biodiversity:	The diverse and interdependent composition of lifeforms in an ecosystem that is necessary for sustaining flows of energy and materials indefinitely.
Interspecies equity:	Respect for all forms of life based upon an ethic that treats all creatures decently and protects them from cruelty and avoidable suffering.
Carrying capacity:	The capacity of ecosystems to support continued growth in population numbers, resource consumption, and waste production.
Steady-state economy:	An economy in which the demands of resource consumption for economic growth and improving social well-being are in balance with resource supply and production.
Ecospace:	The total amount of energy, land, water and other resources that can be used regionally or globally without environmental damage, disadvantaging the capacities of others to meet their basic needs or impinging on the rights of future generations.
Ecological footprint:	The area of land and water needed to support the total flow of energy and materials consumed by a community or population.
Sustainable production:	Industrial processes that transform natural resources into products that society needs in ways that minimise the resources and energy used, the wastes produced and the effects of work practices and wastes on communities.

Sustainable consumption:	The use of services and related products to satisfy basic human needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product.
Eco-efficiency:	A strategy for maximising the productivity of material and energy inputs to a production process whilst also reducing resource consumption and waste production and generating cost savings and competitive advantage.
Lifecycle analysis:	A management tool for identifying the net flows of resource and energy used in the production, consumption and disposal of a product or service in order to leverage eco-efficiency gains.
Natural resource accounting:	A strategy that helps a household, corporation or government calculate its real wealth, i.e. the value of total economic production minus the value of the natural and social capital consumed to achieve it.
The 5 Rs:	Reduce, reuse, renew, recycle and rethink!
Local-global links:	The recognition that the consumption of a product or service in one part of the world is dependent on flows of energy and materials in other parts of the world and that this creates potential opportunities and losses economically, socially and environmentally at all points in the local-global chain.
Intergenerational equity:	A consideration of the need to live off net resource production rather than environmental capital in order to enable future generations access a world that is at least as diverse and productive as the one each generation inherits.
Human rights:	The fundamental freedoms of conscience and religion, expression, peaceful assembly and association which ensure access to democratic participation and the meeting of basic human needs.

Figure 2: A beginning list of sustainable development concepts (continued):

Basic human needs:	The needs and right of all people and societies for fair and equitable access to flows of energy and materials for survival and a satisfying quality of life within the limits of the Earth.
Media literacy:	An appreciation of the role of the public media and marketing and advertising industries in creating perceptions of needs and wants and the skill to identify the roles the media may play in encouraging and undermining sustainable consumption.
Democracy:	The right of all people to access channels for community decision making.
Precautionary principle:	The need to take thoughtful preventative action to address an emerging problem when there is reasonable evidence to indicate the situation could get worse.

These are abstract concepts and it is not proposed that they be taught in ways inappropriate to the developmental needs of students or their preferred learning styles. Rather, they should be taught through concrete case studies at local, national and global scales in ways that are meaningful to students' everyday lives and practical experience.

Education for sustainability requires learning that is holistic and has a moral base.

A wealth of resources using concepts such as these is now available and from which valuable learning experiences may be derived. These include national, state and local state of the environment reports, the National Strategy for Ecologically Sustainable Development and various strategies and initiatives for forests, waste management, coasts and seas, biodiversity, rangelands, landcare, climate change, renewable energy, transport, urban and regional development, sustainable communities and environmental health.

Important international resources include the annual Human Development Reports published by UNEP, the Global Environmental Outlook (GEO) reports prepared by UNEP, and the action plans of United Nations conferences and conventions concerning sustainable development. These include the Rio Earth Summit (and preparations for Rio+10 in 2002), the Copenhagen conference on social development, the Cairo conference on population, the Beijing conference on women, the Rome conference on food security, the Istanbul Habitat II conference on human settlements, and the international conventions on biodiversity, climate change, desertification and forest principles (see Hopkins, Damlamian and Lopez Ospina 1996).

This is not a prescriptive listing, but rather a way of showing both the scope of reorienting education towards sustainability and the available resources from which teachers, syllabus writers and textbook authors can draw. Such resources and themes may be integrated across, and used to enrich learning in, all subjects in the school curriculum. The comprehensive nature of these concepts and themes also points to the possibility of a valuable inter-disciplinary subject at the senior secondary school level that can help young people integrate issues and concerns of sustainability.

1. Teaching and Learning Approaches

Education for sustainability requires approaches to teaching and learning that enhance knowledge and understanding, promote ethical and critical reasoning, and motivate and equip young people to participate in community affairs. Issues of pedagogy are therefore vital in reorienting education towards sustainability.

Pedagogy is a term that involves more than the traditional concept of teaching and learning strategies; pedagogy includes the teacher's visions of what education is for and how society might be. Whatever sustainable development themes and topics are adopted, or whatever curriculum structures are adopted, the teacher's beliefs and attitudes, together with the teaching strategies chosen, will significantly affect the nature of students' learning experiences and the objectives achieved. Such choices and attitudes determine whether or not curriculum plans reproduce the existing social and cultural mores, or contribute to empowering people for participation in civil society, as do the styles of communication in and beyond the school.

Important aspects of pedagogy in education for sustainability include encouraging students to explore questions, issues and problems of sustainability, especially in contexts relevant to them and their communities; this involves student-centred and interactive enquiry-based approaches to teaching and learning. Such approaches do not preclude the use of more teacher-centred methods such as explanation, narration and demonstration where appropriate. However, they do emphasise using the environment and community as a resource for learning and student-centred activities such as debating controversial issues, role play, simulation games, values clarification and analysis, as well as a range of creative and experiential activities. (Note: For guidelines and professional development packages on these strategies, see: Fien, Heck and Ferreira 1997 and UNESCO 2001).

Student-centred and enquiry-based approaches to learning can contribute to students developing capacities for:

- identifying questions, issues and problems as the starting point for their own learning;
- being active participants in meaningful learning;
- applying a wide range of intellectual, social, practical and communication skills and abilities;
- clarifying, analysing and challenging attitudes and values through an open interchange of ideas and opinions; and
- exercising political literacy through an understanding of the social world and how to participate in it.

This enquiry-based approach, which focuses on issues and problems, may cause worry and concern for students if not handled well. However, young people in Australia (see Table 1) and, indeed, most parts of the world, are already seriously concerned about the future of the environment and their place in it. Thus, education for sustainability is a response to the existing concerns of young people, and seeks to help them constructively deal with the anxiety and worry they already feel.

3. Reforming education policy for sustainability

Most countries in the world, including Australia, can point to ways in which their education systems are being reoriented towards sustainability as scientific knowledge of the environment expands and public awareness of the scale and severity of environmental problems increases. As a result, curriculum guidelines have been developed, whole-school approaches to curriculum planning adopted for environmental education, syllabuses revised to infuse environmental perspectives, and specialist environmental education centres established. Despite these initiatives, a number of outstanding issues and problems confront the reorientation of education towards sustainability in Australia.

First, many policies and initiatives by Ministries of Education tend to be embedded within pre-Earth Summit (1992) conceptions of the world. Similarly, State environmental education policies have tended to favour science and nature conservation rather than the holistic imperatives of education for sustainability (as in Figure 1).

Second, most recent initiatives to promote environmental education in Australia have tended to come from Ministries of Environment, Primary Industries or Natural Resources rather than Ministries of Education. While welcome, such efforts have tended to be directed to specific environmental issues rather than a whole-of-society commitment to sustainability. They have tended to concentrate upon awareness-raising and information campaigns and to focus on individual behavioural change rather than broader educational goals. The Landcare education movement and Waterwatch are notable exceptions.

Indeed, sustainable development is not well understood as a concept outside of limited environmental circles nor is it seen as a whole-of-government commitment. Education systems in Australia, especially outside of the State systems, have few policies or guidelines for environmental education. The result has been a lack of coherent strategies and long term planning. Even in those systems that do have such policies, many have not been revised to incorporate the broad social, economic and political, as well as conservation, aspects of sustainable development.

Some changes in educational priorities are currently under way. Some of these were outlined in Section 1, especially changes in science education that have flowed from the development of a national collaborative framework for curriculum development in Australia.

Perhaps, the most significant reform has been the establishment of Studies of Society and the Environment as a compulsory area of learning for all students up to Year 10 across the country. Integrating social and environmental education has the potential to embed principles of sustainability in the curriculum of all students.

The three core values in this learning area are sustainable development, justice and democracy. These are the same principles outlined as a basis for sustainable living in Figure 1. The key concepts used to structure learning in Studies of Society and the Environment are multidisciplinary, and draw from ecology, geography, history, economics, sociology, psychology, anthropology and political science. Teachers are given extensive freedom to choose themes and case studies that are relevant to young people's developing experiences and understanding of the world and to integrate insights from these disciplines to guide them towards appreciating positive visions of the future and their places within it. The potential to educate for sustainability through Studies of Society and the Environment is limitless.

Integrating social and environmental education has the potential to embed principles of sustainability in the curriculum of all students.

Nevertheless, a number of tensions remain. Historically, tight political control has been exerted over the interpretation of the core values in the Studies of Society and the Environment curriculum outline (eg. the definition provided for justice focuses on equality of opportunity not equality of outcomes while the definition for democracy emphasises legal rights and responsibilities and representative democracy not participatory democracy). Such control does not auger well for sustainability to be presented to students as a dynamic balance of conservation, appropriate development, democracy, peace and equality (see Gilbert, Gordon, Hoepper and Land, 1992). Similarly, there has been a backlash against the multidisciplinary study of sustainability issues through Studies of Society and the Environment, especially from some geography teachers. Indeed, one complained to a Radio National interviewer that there was too much emphasis on issues such as the environment, sustainability and citizenship in Studies of Society and the Environment and not enough upon geography, itself (see Fien 2000).

However, on the positive side, the national guidelines for key learning areas are being implemented in what are considered to be locally relevant ways by the various education systems in Australia. Schools and teachers have been given considerable autonomy to choose the depth and breadth of treatment, choice of illustrative case studies, teaching approach, and learning materials. Such independence gives teachers the opportunity to respond to students' concerns about local and global issues – and paramount among these, as seen in Table 1, are the 'sustainability' issues of peace, the environment and social development.

Other encouraging developments in Australian education include the current emphases on teaching enquiry skills and social responsibility and on assessing the broad outcomes of learning, rather than the mastery of knowledge alone. The national curriculum movement has encouraged this change, as have recent education reviews in most States and Territories which have emphasised a futures orientation in the curriculum and learner-centred and life skills based approaches to classroom teaching.

For example, to ensure that teaching and learning is interdisciplinary and contributes to this goal, the Queensland 'New Basics' policy recommends that the curriculum be organised around four life themes (Life Pathways and Social Futures, Multiliteracies, Numeracy and Communication Media, Active Citizenship, and Environments and Technology) and that learning be seen as a series 'rich tasks' (or broad learning experiences) to which different subject areas contribute. This is the kind of enquiry-based multidisciplinary perspective that underlies education for sustainability. Figure 3 illustrates how a sample rich task, in the area of biotechnology, can help Year 9 students develop the knowledge, skills and commitment to work for a sustainable future.

Summary

This chapter has outlined the broad and far-reaching changes needed to Australia's educational practice if we are to prepare the present generation of students to be active participants in the search for a sustainable future. These changes present direct challenges to those who make policy decisions for education, and for those who have responsibility for implementing them. Some of these challenges are taken up in the recommendations that follow.

Figure 3: A sample 'rich task' that contributes to education for sustainability (Education Queensland 1999)

Rich Task No 5 - Year 9

Biotechnology – Emerging Issues and Future Trends

Students will show that they are able to debate a range of issues, including ethical and moral questions, to do with emerging scientific advances in biotechnology. They use their knowledge of living organisms to prepare summaries, arguments and counter-arguments to use in public forums. They make reasoned predictions and prepare a plan for a world conference to be held 5 years hence, taking account of purpose, themes, presenters and audiences.

New Basics

Students develop knowledge and skills about:

Life pathways and social futures

- Future job opportunities and changing labour market forces in an Australian economy based on emerging technologies.
- The influence of innovation, enterprise and scientific research on business and trade in Australia and its trading partners.

Multiliteracies, numeracy and communication media

- How techniques of language use influence interpretations of and responses to texts involving challenging themes and issues.
- Sources of information about scientific advance and forums available to the general community for discussing controversial issues and learning about emerging fields of knowledge.
- How language is used in different ways to report research findings in order to meet the needs, interests and expectations of specific audiences.
- Ways in which societal fears and concerns about scientific advancement are reflected in science fiction in a variety of media.

Active citizenship

- Population growth rates and changing demographic patterns locally and globally.
- Relationships among scientific research, technological application and changing social attitudes.
- Interactions between religious beliefs and scientific endeavour.
- How laws relating to medical practice and research have changed over time and legal issues, such as those relating to work with embryos that are yet to be resolved.

Environments and technology

- The structure of matter, cell chemistry, organic structures and life systems.
- Reproductive processes and strategies that influence the survival of individuals and species.
- The genetic basis of inheritance and theories concerning the evolution of organisms.
- Scientific advances in genetic manipulation, animal and plant reproduction and the human genome project.
- Past strategies, successes and failures in disease control in plants and animals.
- The rapid nature of species decline and implications for the future of the gene pool on Earth.
- Ways in which technological change has impacted on work patterns and job opportunities over time.
- Strategies that individuals and groups have used in order to play a part in management and decision making about technological research and development.

3. Recommendations for the education system, schools and teachers

PAGE 30

Education seeks to provide the intellectual enlightenment and the spiritual emancipation in the search for a better existence for all life on earth.... The sustainability transition is in effect a social and political revolution that hopefully can take place through peace and understanding. This is the challenge for environmental education for the next generation.

Source: O’Riordan 1994, p. 8.

If we can stop the present descending spiral of unsustainable development, Australia would be on the way to sustainability early in the 21st century. Education can play a vital part in this process, but not without substantial reorientation. Indeed, as we have seen in this paper, reorienting education towards sustainability is essentially a process of educational reform and innovation. Educational administrators and teachers will need to reflect critically on the following suggestions for changes to national priorities, educational goals, curriculum and pedagogy and to interpret and focus them for action in national and local contexts.

1. Affirming the Role of Education in Building Civil Society

Ministers of Education, teachers’ unions, ‘Parents and Friends’ associations and specialist teacher association such as the Australian Association for Environmental Education, Australian Science Teachers Association, Australian Geography Teachers Association and the Australian Federation of Societies for Studies of Society and the Environment need to affirm the role of schools in building civil society. A whole-of-government commitment to sustainable development action is needed, not just isolated actions by Environment Australia, State/Territory ministries of conservation and natural resources or the small environmental education units in ministries of education.

2. Promoting New Educational Practices

We need to continue the development of a ‘new generation’ of educational thinking and practice to educate young people to take a role in achieving sustainability. It should be one that develops alternative frameworks for curriculum, takes a whole-of-school approach, and offers choices of teaching and learning approaches.

A case could be made for the development of a special subject in sustainable development at the upper secondary school level. However, of greater importance is the need for every school subject to play its part in ensuring that the principles of sustainability are embedded in the normal day to day learning experiences of students.

There is not an area of the curriculum or school policy that should not reflect the principles of ecology and conservation, peace and equity, appropriate development and democracy that underlie sustainability. Preparing students to take a role in a society searching for more sustainable lifestyles is so important that it cannot be left to one or two environmentally-related subjects to teach. Focusing on issues of social justice and active citizenship as well as ecological sustainability in reorienting education towards sustainability means that increased attention is needed to the humanities and social sciences in environmental education.

Ministers of Education, teachers' unions,
'Parents and Friends' associations and specialist
teacher associations need to affirm the role of schools
in building civil society.

Studies of Society and the Environment, geography and science will have a central role. It is in recognition of this that Studies of Society and the Environment are now compulsory for all students to Year 10 in Australia. But students mature and make important life decisions as they prepare to leave school, so sustainability needs to be infused into these important final two years of secondary school.

Education for sustainability also requires teaching and learning experiences that encourage students to explore questions, issues and problems of sustainability in contexts relevant to them and their communities. This requires student-centred and interactive enquiry-based approaches that, wherever possible, use the environment and community as a resource for learning, and involve such activities as debating controversial issues, role play, simulation games, values clarification and analysis, and discovery learning as well as a range of creative and experiential activities.

To achieve these changes, some of the underpinning structures of education also need reform.

3. Supporting curriculum reform

Sustaining the sort of innovative curriculum reforms discussed above requires teachers who understand concepts and principles of sustainability, who know how to integrate them into their teaching programmes and practices, and who are confident and proficient in the use of student-centred, interactive and outcomes-based teaching strategies. It also requires the development of assessment policies and practices that enable local schools and teachers to develop assessment strategies relevant to their students' needs and teaching programmes. Thus, two important actions are recommended:

The UNESCO-UNEP International Environmental Education Programme has described the preparation of teachers as "the priority of priorities."

A. School-based Assessment: The tradition of school-based curriculum development in Australia can be vastly improved by establishing processes of monitoring and moderation so that assessment and certification can be increasingly managed at the level of the local school. This is now the case up to Year 10 in almost the whole of Australia and much innovative practice is now evident. However, the power of universities over the Years 11-12 curriculum in some States needs to be reviewed. Much can be learnt from the three decades of experience in school-based assessment for matriculation purposes in Queensland and the Australian Capital Territory. With a ceiling on the growth of student numbers in most Australian universities, the general education values of Years 11 and 12 – and the enormous potential of education in these upper years of schooling to contribute to sustainability - need to be asserted. However, the 'pencil and paper' and cognitive orientations of external examinations at the end of year 12 prevent the assessment of important aspects of educating for sustainability, eg. developing an ethic of care, working cooperatively, community service, resolving conflict peacefully, oral and group skills. And, unfortunately, what cannot be assessed is often not taught. However, these outcomes can be assessed at the school level through group assignments, contract-based assessment and the development of student profiles. Hence, the recommendation for assessment reform at the Year 11-12 level.

B. Teacher Education Reform: The UNESCO-UNEP International Environmental Education Programme has described the preparation of teachers as "the priority of priorities." Changes

are needed in both pre- and in-service teacher education to reorient courses and programmes towards sustainability. Teacher professional development needs to be empower teachers to maximise student and community participation in negotiating what and how students learn and for what purposes. Four principles for a framework for education for sustainability in a teacher education programme were suggested:

- Ensure that all teachers have opportunities to develop familiarity with (i) the concepts and processes of sustainability, and (ii) the professional roles and skills needed to teach effectively for participation in civil society.
- Education for sustainability should be infused into the core and elective education studies of all pre-service teacher education students.
- Additional specialist studies should be provided for students who wish to concentrate in this area, eg through specific course(s) in sustainable development and/or applied curriculum studies for different school subjects.
- Regular opportunities for continuing in-service professional development should be provided for teachers to encourage reflection on their commitments and practices in teaching for a sustainable future. (Board of Teacher Registration, Queensland 1993)

Reorienting education for sustainability does not require large additional sums of money; it does require political will.

Reorienting education for sustainability does not require large additional sums of money; it does require political will, from governments willing to model an inter-departmental, cooperative approach to sustainability. Schools and the community could then take up that lead with whole-of-school, community-inclusive approaches that aim to engage each individual, adult and child, in the process of seeking sustainable lifestyles. Sustainability in all its dimensions is the goal; it is a goal that cannot be reached by technological 'fixes', by scientific research, or by government edict. It is a goal that requires commitment across the community. To engage people in that process, schools need to build up Australia's social capital in the form of skilled, critically aware citizens.

References and further reading

PAGE 34

For reasons of presentation and readability, referencing in the Tela series of papers is kept to a minimum. The main sources are listed here, together with other references that take the issues beyond the scope of this paper.

Australian Education Council (AEC) (1994) *A Statement on Science for Australian Schools*, Curriculum Corporation, Melbourne.

Australian Education Council (AEC) (1994) *A Statement on Studies of Society and Environment for Australian Schools*, Curriculum Corporation, Melbourne.

Board of Teacher Registration, Queensland (1993) *Environmental Education in Teacher Education*, Board of Teacher Registration, Queensland, Brisbane.

Connell, S., Fien, J., Lee, J., Sykes, H. and Yencken, D. (1999) "If it doesn't directly affect you, you don't think about it": A qualitative study of young people's environmental attitudes in two Australian cities, *Environmental Education Research*, Vol. 5, No. 1, 95-113.

Cross, R. (Guest Editor) (1999) Special issue: Public Understanding of science: Implications for education, *International Journal of Science Education*, 21 (7).

Cross, R. and Fensham, P. eds. (2000) *The Public Understanding of Science*, Melbourne Studies in Education, Melbourne.

Environment Australia (1999) *Today Shapes Tomorrow: Environmental Education for a Sustainable Future*, Environment Australia, Canberra.

Education Queensland (1999) *New Basics Project*. [on-line]
URL: <www.education.qld.gov.au/corproate/newbasics/html>

Fien, J. (1993) *Education for the Environment: Critical Curriculum Theorising and Environmental Education*, Deakin University Press, Geelong.

Fien, J., ed. (1993) *Environmental Education: A Pathway to Sustainability*, Deakin University Press, Geelong.

Fien, J. and Greenall Gough, A. (1996) Environmental education, in R. Gilbert, ed., *Studies of Society and the Environment*, Macmillan, Melbourne, Ch. 12.

Fien, J., Heck, D. and Ferreira, J., eds. (1997) *Learning for a Sustainable Environment: A Professional Development for Teacher Educators*, UNESCO-ACEID, Bangkok.

Fien, J., Yencken, D., Connell, S. and Sykes, H. (2001) Australia, in Fien, J., Yencken, D and Sykes, H., eds, *Young People and the Environment: An Asia Pacific Perspective*, unpublished manuscript submitted for publication.

Gough, A (1997) *Education and the Environment: Policy, Trends and the Problems of Marginalisation*, ACER, Camberwell, Vic.

Greenall, A (1981) Environmental education: A case study in national curriculum action, *Environmental Education and Information*, 1 (4), 285-294.

Greenall, A (1987) A political history of environmental education in Australia: snakes and ladders, in I Robottom (ed.), *Environmental Education: Practice and Possibility*. Deakin University Press, Geelong. Ch. 1.

Gilbert, R., Gordon, K., Hoeppe, B. and Land, R. (1992) Love's labours lost? - Writing a National Statement, *Curriculum Perspectives*, Newsletter Edition, 12 (4), 25-27.

Huckle, J. (1991) Education for sustainability: Assessing pathways to the future, *Australian Journal of Environmental Education*, 7, 49-69.

Huckle, J. and Sterling, S. (1996) *Education for Sustainability*, Earthscan, London.

Jensen, B. B. and Schnack, K. (1997) The action competence approach in environmental education, *Environmental Education Research*, 3 (2), 163-178.

Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) (1999) *The Adelaide Declaration on National Goals for Schooling in the Twenty-First Century*. [on-line] URL: < <http://www.curriculum.edu.au/mceetya/nationalgoals/>>

O'Riordan, T. (1994) Education for the sustainability transition, *Annual Review of Environmental Education*, 8, 8-11.

Orr, D. (1992) *Ecological Literacy: Education and the Transition to a Postmodern World*, State University of New York Press, Albany.

Schnack, K. (1996) Internationalisation, democracy and environmental education, in S. Breiting and K. Nielsen, eds., *Environmental Education Research in the Nordic Countries*, Proceedings of the Research Centre for Environmental and Health Education No. 33, Royal Danish School of Educational Studies, Copenhagen..

Smyth, J. (1995) Environment and education: A view of a changing scene, *Environmental Education Research*, 1 (1).

UNCED (1992) Promoting education and public awareness and training, *Agenda 21, United Nations Conference on Environment and Development*, Conches, Ch. 36.

UNESCO (1997) *Environment and Society: Education and Public Awareness for Sustainability*, Background Paper prepared for UNESCO International Conference, Thessaloniki.

UNESCO (2001) *Teaching and Learning for a Sustainable Future*. [on-line] URL:

<http://www.unesco.org/education/tlsf>

UNESCO-UNEP (1978) The Tbilisi Declaration, *Connect*, III (1), 1-9.

UNESCO-UNEP (1990) Environmentally educated teachers: The priority of priorities?, *Connect*, XV (1), 1-2.

Wheeler, K. and Bijur, A. eds. (2000) *Education for a Sustainable Future*, Plenum Publishers, New York.

Yencken, D., Fien, J., Sykes, H., eds. (2000) *Environment, Education and Society in the Asia-Pacific: Local Traditions and Global Discourses*, Routledge, London.

About the author

John Fien is Associate Professor and Director of the Centre for Innovation and Research in Environmental Education at Griffith University. He has worked extensively with UNESCO and UNEP on professional development and environmental education and is the author of their training guides 'Teaching for a Sustainable World', 'Learning for a Sustainable Environment' and the multimedia package 'Teaching and Learning for a Sustainable Future'. He has published many books and papers on environmental education.

The first Tela paper, Health and the Environment, written by Charles Guest, Bob Douglas and Rosalie Woodruff from the Australian National University and Tony McMichael from the University of London, was launched by Sir William Deane, Governor General of Australia, in June 1999. Two responses to this paper and the series are:

This first paper admirably fulfils expectations for the Tela series; comprehensive, learned, accessible, reasoned in its approach, 'popular' in the best sense of that word, as embracing the interests and needs of the broad community. And I might add, a global and broad visioned approach.

Sir William Deane

The first paper, "Health and the Environment", is an excellent appreciation of the fact that human health and environmental health are inextricably related. Future Tela papers cover almost every aspect of social life and are written with a focus on the most neglected of the three bottom lines, the environment. I urge you to read and discuss them.

Professor Emeritus Frank Fenner

Subsequent papers published are:

- 'One Earth: Social and Environmental Justice' by Nicholas Low and Brendan Gleeson
- 'Sustainable Australia: Refocusing Government' by David Yencken

These papers are available on < www.acfonline.org.au. >

About the Tela series

The Tela series is devoted to the exploration of the relationships between environment, economy and society and the ways in which the economy and society may need to change to achieve ecological sustainability in the 21st century. Tela, a web in Latin, has been chosen as the name for the series to illustrate the connectedness of the physical world and human societies.

Individual papers in the series are being written by well-known Australian and international scholars and scientists for a general readership. They will be used to generate debate about key issues that will confront all societies in the 21st century.

Forthcoming papers in the Tela series are being written on:

- the business of biodiversity
- science, politics and the environment
- business and the environment
- media and the environment
- universities and the environment
- law and the environment
- trade unions and the environment
- Indigenous people and the environment
- households and consumers and the environment