

# Support for the Environmental Education Policy: Technological and Applied Studies



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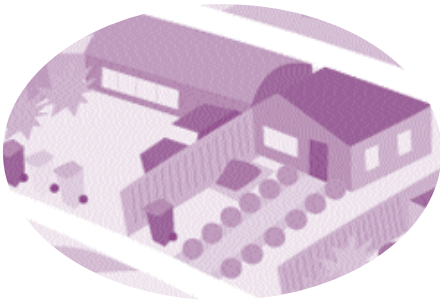
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## Introduction

*Support for the Environmental Education Policy: Technological and Applied Studies* has been prepared to assist technology teachers in the implementation of the *Environmental Education Policy for Schools*. This document should be read in conjunction with the support document, *Implementing the Environmental Education Policy in your school*.

The *Environmental Education Policy for Schools* aims to foster students' understanding of the environment as an integrated system, and to develop attitudes and skills which are conducive to the achievement of ecologically sustainable development (page 10).

The policy has three focus areas which schools must address:

- curriculum
- management of resources, and
- management of school grounds.



## Curriculum

Page 12 of the policy states that schools are expected to:

- identify and address those outcomes which are specific to environmental education in syllabuses K-12
- integrate the teaching of environmental education topics and issues to support outcomes in other syllabuses
- use the opportunities provided by special events and actions of the school community to enhance those student learning outcomes related to environmental education.

## Management of resources

Page 14 of the policy states that schools are expected to:

- address the management of energy, products, materials, waste and water
- employ best practice in the sustainable management of resources and comply with government regulations, laws and policies, such as the Waste Reduction and Purchasing Policy (WRAPP), stormwater legislation and the Litter Prevention Program
- maximise learning opportunities created by the school's management of resources to make links with the curriculum.

## Management of school grounds

Page 15 of the policy states that schools are expected to:

- use and develop school grounds and buildings to enhance and achieve the objectives of environmental education and syllabus outcomes
- use their grounds and buildings as learning areas
- identify and implement long-term strategies that will rehabilitate areas of the grounds and buildings and reflect best practice in sustainable management.

## How environmental issues can be addressed in the curriculum

Appropriate technology is defined as "technology which, in its creation and use, meets human needs while considering the short- and long-term consequences for the society and the environment" Gordon, B. *Make the Future Work*, in *Appropriate Technology: a Teachers' Guide* 1996. Board of Studies NSW. Sydney (Page 9 ). Environmental education is an integral part of technology education.



Most technology syllabuses, especially the more recent syllabuses, include specific requirements that students learn about the impact of technology on the environment and how environmentally sustainable practices can be implemented in activities of design and production. Technology teachers need to thoroughly address the environmental issues specified in syllabuses.

In addition, all technology subjects provide scope for embedding environmental education into teaching and learning programs and practices. Technology teachers should:

- consider using an environmental topic or event as a vehicle for delivering the syllabus outcomes and content, for example, the creation of an information system to manage data collection and analysis for a school Streamwatch project in Information Processes and Technology
- identify environmental issues and incorporate teaching and learning activities which help students to consider the issues
- address environmental issues as they arise in the classroom

- require students to consider environmental impact and to act responsibly in their resource usage and development of projects.

An analysis of the relationship of environmental education to technology subjects is provided on the following pages. Some ideas about how environmental education can be incorporated are also included.

## MANDATORY DESIGN AND TECHNOLOGY

The mandatory Design and Technology course provides an ideal vehicle for the integration of environmental education. Environmental sustainability is one of the prescribed dimensions of the syllabus. The course requires environmental sustainability to be addressed in every design project. This may occur through consideration of matters in the design project, such as:

- the source and impact of the materials or chemicals used
- waste disposal
- energy usage
- environmentally sustainable practices
- case studies of best practice from industry
- cradle-to-grave analysis of the long-term costs of the student's project.

Some ideas for design briefs that focus on environmental education are outlined below.

### Design and Technology (mandatory)

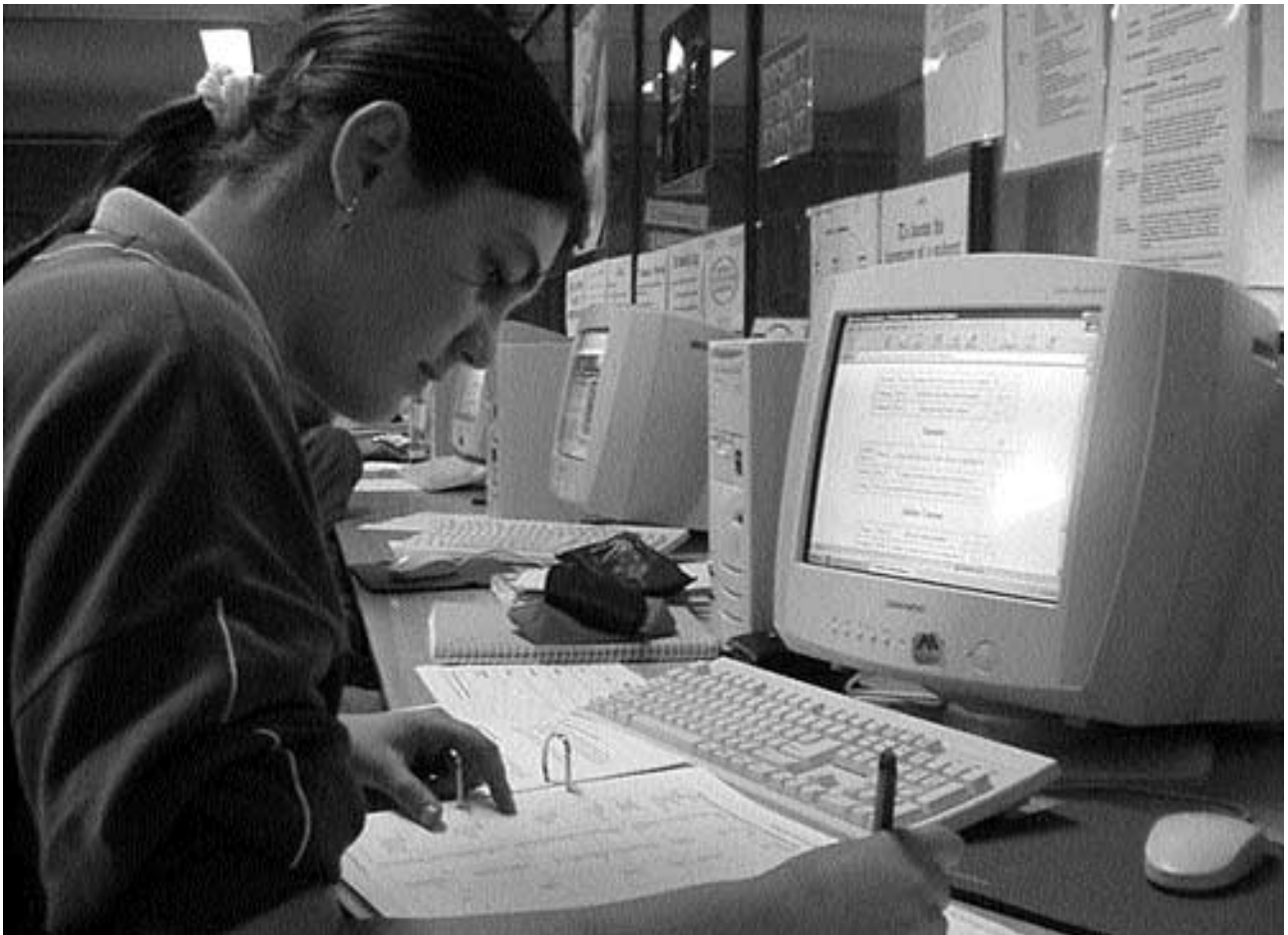
Context area	Design briefs which require students to:
Agriculture	<ul style="list-style-type: none"> <li>• address problems associated with soil erosion and salinity at a site in the local area</li> <li>• design a school vegetable garden based on principles of integrated pest management</li> </ul>
Built environment	<ul style="list-style-type: none"> <li>• redesign and improve school spaces in order to create effective <i>Learnsapes</i></li> <li>• design plans for an energy-efficient building</li> </ul>
Engineered systems	<ul style="list-style-type: none"> <li>• develop simple mechanisms to aid in recycling (e.g. aluminium cans crusher, paper bailer)</li> <li>• design and make a circuit that utilises solar power (e.g. power a fan, switch on a light)</li> </ul>
Food	<ul style="list-style-type: none"> <li>• design and package an environmentally friendly, nutritional food snack for sale at the canteen</li> <li>• analyse organic wastage from the school's food preparation rooms and design a system to recycle organic matter for use on the school farm</li> </ul>
Information and communication	<ul style="list-style-type: none"> <li>• design and implement a strategy for promoting to the school community World Environment Day or a similar environmental initiative</li> <li>• publish a web page on the school's site providing information about a whole-school environmental initiative (e.g. recycling).</li> </ul>

## ELECTIVE TECHNOLOGY SUBJECTS

The following table identifies specific syllabus outcomes or content requirements to address environmental issues in elective technology subjects.

Elective technology syllabus	Syllabus requirements related to environmental issues
Agriculture Stage 6	<p>Major content areas in <i>Plant and Animal Production</i> focus on environmentally sustainable development such as:</p> <ul style="list-style-type: none"> <li>• sustainable agricultural production</li> <li>• the farming practices that have led to soil degradation</li> <li>• sustainable farming practices</li> <li>• the role of individual farmers, the broader community and government in reducing the harmful effects of agriculture and in conserving water and protecting waterways</li> <li>• the tension between sustainability and short-term profitability</li> </ul> <p>Microbes and invertebrates</p> <ul style="list-style-type: none"> <li>• the role of microbes and invertebrates in the decomposition of organic matter</li> <li>• the problems of pesticides and chemical resistance in target organisms</li> <li>• the importance of labels on agricultural chemicals as they relate to safe practice and correct usage</li> <li>• the use and potential for integrated pest management.</li> </ul> <p>All content in the elective topic, <i>Sustainable Land and Resource Management</i>, is focused on environmental issues.</p>
Agriculture Stage 5	<p>Outcomes related to environmental education include:</p> <p>4.1 explains how current and past practices have affected sustainability</p> <p>4.2 explains that effective management decisions take account of profitability, sustainability and ethics</p> <p>11.2 demonstrates an understanding of the complex relationships between current use and conservation of agriculture resources and future needs</p> <p>13.1 demonstrates... personal responsibilities in achieving ecological sustainability</p>
Computing Studies Stage 5	<p>The syllabus has no specific requirements but it does require social and ethical issues to be addressed. The syllabus provides opportunities for either a focused theme of study or the treatment of environmental issues within broader topics.</p>
Design and Technology Stage 6	<p>Environmental issues are a significant aspect of the content being addressed in design and production, in design projects and in the area of innovation and emerging technologies. Course objectives require students to develop knowledge, understanding and appreciation of the interrelationship of design, technology, society and the environment. Outcomes P1.1, 2.2, 4.3 and H2.1, 2.2, 4.2, 4.3, 6.2 address the impact of design and technological activity on the environment.</p>
Engineering Studies Stage 6	<p>Outcomes P4.3 and H4.3 address the environmental implications of technological change in engineering. <i>Modules of Landscape Products, Braking Systems, School-Based Elective, Civil Structures, Personal and Public Transport and Aeronautical Engineering</i> require students to learn about environmental implications.</p>

Elective technology syllabus	Syllabus requirements related to environmental issues
Food Technology Stage 6	Environmental issues and impact are addressed in the HSC course in all core strands and in the optional <i>Contemporary Food Issues</i> strand of <i>Marketplace</i> . The syllabus outcomes that focus on environmental issues are H1.3 and H1.4, and the topics include legislation, waste management, packaging and manufacturing techniques, trends towards ecologically sustainable production, such as organic farming, and reduction of pesticide residue.
Food Technology Stage 5	A number of syllabus outcomes, such as K1.2 and K1.3, require students to understand the impact of food production, processing and packaging technologies on the environment. Outcome A2.2 requires student to display a commitment to the efficient management of resources in order to sustain the environment. Environmental perspectives are specified in most focal issues in the content of the syllabus.
Industrial Technology Stage 6	Outcomes P7.1 and H7.1 and the content specified in the Preliminary and HSC <i>Industry Study</i> section of the content discuss environmental factors such as recycling, pollution, government legislation, environmental impact statements and sustainable development. Industry-specific focus areas may include relevant environmental issues. Students may consider environmental impact in their use of resources in projects.
Information Processes and Technology Stage 6	Syllabus outcomes P3.1 and H3.1 address the effects of information systems on the individual, society and the environment. The syllabus also provides opportunities for project work based on an environmental theme and for the treatment of environmental issues related to content areas, such as social and ethical issues.
Software Design and Development Stage 6	The syllabus has no specific requirements but provides opportunity for either project work based on an environmental theme or the treatment of environmental issues related to the content areas.
Technical Drawing Stage 5	The modules of <i>Australian Architecture</i> , <i>Architectural Drawing 1 and 2</i> , and <i>Landscape Drawing</i> specify environmental considerations. Other syllabus topics provide opportunities for either a focused theme of study or the treatment of environmental issues as they arise.
Technics Stage 5	The rationale of the syllabus states that the subject encourages the conservation of materials and natural resources. An objective of the syllabus is for students to select and use materials with due regard to the principles of conservation. References to environmental issues occur within specific modules.
Textiles and Design Stage 6	Appropriate textile technology and environmental sustainability are important topics in the HSC area of study of the <i>Australian Textile, Clothing, Footwear and Allied Industries</i> . The content also specifies that students learn about how environmental factors influence design and the success or failure of designers, and the advantages and disadvantages of textile technologies on the environment.
Textiles and Design Stage 5	The syllabus area of <i>Social Significance</i> makes reference to environmental concerns as a factor influencing consumer's selection of textiles. The syllabus provides some opportunities for either a focused theme of study or the treatment of environmental issues within broader topics.



## HOW ENVIRONMENTAL ISSUES CAN BE ADDRESSED IN THE MANAGEMENT OF RESOURCES

The scope of resources used in technology classrooms ensures that this focus area of the environmental education policy is particularly relevant to technology teachers.

Teachers need to investigate best practice models in the sustainable management of resources, including energy, materials, chemicals, waste and water, and ensure their practices comply with relevant government regulations, laws and policies.

All technology subjects involve students using resources to design and produce products, systems or environments that meet human needs. Students need to explicitly and systematically learn about, and learn how to implement, strategies for managing resources.

Following are some issues and ideas for strategies that are particularly relevant to technology subjects.

Resource management issue relevant to technology subjects	Suggested strategies
Efficient use of material and substances	<p>Thoroughly plan the use of materials and substances. Instruct students in techniques to minimise wastage. For example:</p> <ul style="list-style-type: none"> <li>• Adjust cutting out for projects to suit standard material and stock sizes.</li> <li>• Use recycling bins for textile, metal and timber scraps.</li> <li>• Use material from recycling bins for activities to develop students' skills.</li> <li>• Store food carefully to minimise wastage from food spoilage.</li> <li>• Use taps on drums to minimise spills.</li> </ul> <p>Discuss the local and global, long-term, environmental implications of resource wastage at the time that students are making decisions about resource usage. Ask students to consider both the long-term environmental costs, as well as the immediate financial costs, of their resource usage when they are preparing financial plans.</p>
Waste disposal	<p>Systematically plan to minimise or reuse waste wherever possible. For example:</p> <ul style="list-style-type: none"> <li>• Recycle food scraps from food technology classrooms and the canteen to feed poultry or to use for composting.</li> <li>• Use animal manures as organic fertilisers.</li> <li>• Use sawdust from woodwork as garden mulch in school grounds.</li> <li>• Develop procedures for the safe disposal of chemicals such as pesticides, dyes and printing substances, turps, thinners.</li> <li>• Use recognised collection companies for the disposal of specific chemicals.</li> </ul>
Selection of environmentally sustainable alternatives	<p>Be aware of environmentally sustainable resources and practices and discuss and model their use with students wherever possible. For example:</p> <ul style="list-style-type: none"> <li>• Shred used paper for mulch on the agriculture plot.</li> <li>• Use water-based timber finishes and fillers in place of oil-based alternatives.</li> <li>• Use particle board in preference to Medium Density Fibreboard (MDF).</li> <li>• Use integrated pest management (IPM) practices in the agriculture plot.</li> </ul> <p>Encourage and reward students who suggest environmentally sustainable approaches that could be adopted at school.</p>

**Resource management  
issue relevant to  
technology subjects**

**Suggested strategies**

Chemical handling and storage

Follow the advice in *Chemical Safety in Schools* (CSIS) regarding the selection, use, labelling and disposal of chemicals.

- Minimise the use of chemicals wherever possible.
- Clean up chemical stores, especially any old and unlabelled chemicals.
- Set up secure storage facilities for all chemicals.
- Correctly label all chemicals.
- Use the specified personal protective equipment when working with chemicals.
- Use spill and splash trays in areas that contain chemicals.



## HOW ENVIRONMENTAL ISSUES CAN BE ADDRESSED IN THE MANAGEMENT OF SCHOOL GROUNDS

The school grounds are the teaching and learning environment for much of agriculture. Agriculture teachers can make an important contribution to this aspect of the policy. For example the agriculture plot could reflect best practice in sustainable land and resource management.

In addition some technology subjects may provide opportunities for teaching and learning activities which use or improve the school grounds. For example Design and Technology provides scope, through context areas such as the built environment, agriculture and engineered systems, to develop projects which focus on environmentally sustainable development of the school grounds.

## REFERENCES

The following are some references that provide specific support for technology subjects.

- *Appropriate Technology: Designing the Future: A professional development kit for teachers of technology.* Board of Studies NSW, 1996. Sydney (including the teacher reference book entitled *Make the Future Work*, a video and a CD-ROM).
- *Chemical Safety in Schools (CSIS): The safe use and storage of workplace chemicals in schools.* Volumes 1 and 2. NSW Department of Education and Training, 2000
- *Designscapes: Design and Technology and Environmental Education,* NSW Department of Education and Training and the State Forests of NSW, 1998. Sydney.
- *Organic Recycling: Nature's Solution: An Agricultural Awareness Program for Schools.* NSW Department of Education and Training and NSW Agriculture, Sydney.



