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Teaching Environmentally Sustainable Design in Schools

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TEACHING ENVIRONMENTALLY SUSTAINABLE DESIGN IN SCHOOLS

OECD Environment Ministers met in April 1998 and agreed on shared goals for implementing sustainable development, expressing “the hope that other Ministers would integrate environmental concerns into their policies”. They outlined a set of priority areas for work for the OECD which includes the development of “effective policy approaches for improving resource efficiency”. The following report provided by John Gelder is particularly pertinent in this context.

Introduction

The construction of schools which set out to be models of environmental responsibility – eco-schools – is becoming more common. Some educational jurisdictions have formal programmes for this, such as Ile-de-France’s Ecolyce programme (PEB Exchange n° 31). Where there are no such programmes, environmentally-friendly demonstration schools are often built e.g. Essex County Council’s Great Notley primary school, in the United Kingdom (Slavid, 1998), and the New South Wales Department of School Education’s Nemingha Public School, in Australia (Prasad and Fox, 1996).

Such initiatives are to be encouraged. The teaching of design at tertiary level is often aimed at provision of sustainable architecture, after all. But teaching an awareness and appreciation of the issues at pre-tertiary level is a vital part of the process, by developing an informed public.

This article explores three ways in which students may be taught about environmentally sustainable design. The first is through the passive example of the school premises. The second is through architects-in-schools schemes, with reference to the school premises. And the third is through environmental assessment by students of the school premises. Examples are given of how each of these addresses sustainable design and of how they may be combined to do so.

Environmentally sustainable design

In broad terms, sustainability is understood to mean restoring, preserving and enhancing nature and culture for the benefit of all life, present and future

(RAIA 1995). Environmentally sustainable design of buildings refers to maximising a building’s positive impacts on nature, and minimising its negative impacts, over the whole of its life.

A major component is limiting the use of non-renewable resources, and particularly of fossil fuels, which has the added benefit of reducing greenhouse gas emissions – another major component of environmentally sustainable design.

Schools as aids for teaching design

PEB encourages the use of school grounds as a teaching resource, generally with a view to raising awareness of the natural environment, its complexity and its vulnerability (PEB Exchange n° 33). School buildings, like school grounds, can be designed with this educational purpose in mind. New and refurbished school buildings can be an active part of teaching environmentally sustainable design.

For example, just as exposed building services and structure can assist students in understanding components of the built environment, so exposed features reflecting sustainable design can contribute to teaching it.

Some of these features must be exposed in order to meet their function. Examples include rainwater tanks, photovoltaic systems, solar water heating installations, Trombe walls (for solar heating), sunshading, earth roofs and walls, double glazing, dual-flush toilets, recycling bins and thatched roofing. Other ecological elements that may normally be concealed in order that the building look “normal”, or for functional reasons, can often be exposed too. One example is the “truth window” installed in straw bale buildings, where a section of bale may be viewed behind a piece of glass. Another is leaving adobe or rammed earth walling exposed, and protected by overhangs, rather than having it rendered. Recycled timbers, too, can be exposed (especially if not coloured with preservative).

The concept of a didactic green architecture can be carried further. Permanent graphics identifying building parts, and giving instructions for operation, might be considered. A good example of the didactic approach in sustainable design is the EcoDesign Foundation headquarters in Rozelle, Australia. It occupies a converted school building and, reflecting its educational mission, is quite overt in its sustainability. The double-glazing is screwed onto the old frames inside, the photovoltaic controls are

a glass-fronted feature in the entrance lobby, and materials and components used in the refurbishment are displayed with information on why they were chosen (and where to get them!) (O'Rourke, 1996).

Architects-in-schools schemes

Through architects-in-schools schemes such as those in the United States and Australia, practising architects can assist in the teaching of sustainable design in schools. These schemes are part of wider educational programmes aimed at pre-tertiary students which are intended to help teachers and students understand the decision-making processes behind the built environment and the roles of the various participants, and to foster demand for quality. The US programme, called Learning by Design, is administered by the American Architectural Foundation (AAF) and co-ordinated by the American Institute of Architects. The Australian programme, run by the Royal Australian Institute of Architects, is known as Built Environment Education (BEE). In both cases the architects-in-schools component involves architects visiting schools and assisting teachers and students with their design curriculum, using resource materials produced by the programme.

Both take advantage of the school premises (e.g. Learning by Design offers activities in which "students explore how [their] classroom works and why"), and both address the issue of sustainability. The AAF Web Site (see references) offers the following:

"The ultimate goal [of Learning by Design] is for every student to develop the ability to live in harmony with the natural environment and the skills to appreciate, evaluate, and contribute to the design of a quality human environment."

BEE has brought the topic of environmentally sustainable building design into secondary schools through its book *The Greenhouse Effect & Built Environment Education*, now being revised. This document emphasises, through a dozen worksheets devoted to different topics, energy conservation lifestyles and the efficient use of energy, and makes reference to school premises. The worksheet "Keeping cool and dry inside" asks students to suggest changes to their school buildings to cope with climate change, and "Moving people" prompts them to look at their school's bicycle-rack provisions.



Environmental assessment of schools

A third and much more demanding approach to teaching sustainable design using schools is the formal assessment by students of the environmental performance of their school's buildings and grounds. Having assessed one's "ordinary" school, one could then visit a high-scoring eco-school to learn about how the sustainable design of buildings might be improved.

The United Kingdom has two such assessment schemes. The first, suitable for both primary and secondary school students, is the Eco-Schools Award Scheme, part of a European initiative created and co-ordinated by the Foundation for Environmental Education in Europe. The Scheme has been in operation since 1994, and is run by the Tidy Britain Group. It has its own assessment tool, the Environmental Review. Its checklist covers the following:

1. Litter and waste management.
2. Hot water, insulation, radiators, electricity and the heating system.
3. Vehicle use.
4. Washroom taps, toilets and rainwater use.
5. Use of recycled paper and responsible purchasing.
6. Landscape and wildlife features.
7. Environmental education, the school interior and school involvement.

Under each of these headings, the Review asks a series of questions (e.g. does the school avoid purchasing harmful cleaning materials?) and suggests ideas for action. The assessment has an educational function but is intended also to produce direct environmental benefits as schools undertake a programme of improvements under these headings.

The second, more recent, British scheme has been produced by the Department for Education and Employment. It is the Schools' Environmental Assessment Method (SEAM), derived in part from the BREEAM¹ series for offices, factories, shopping centres and homes. The authors of SEAM intend it to be used (1) by designers of new schools, to ensure that their designs are environmentally responsible; (2) by users of existing schools, for environmental

1. Building Research Establishment Environmental Assessment Method.

assessment of their own premises; and (3) as part of the national secondary curriculum.

SEAM covers a wider and more in-depth set of environmental issues than the Eco-Schools Environmental Review. They include the following:

1. Recycling facilities and waste disposal.
2. Energy (CO₂) rating and energy management. Low NO_x combustion equipment.
3. Home-to-school transport policy.
4. Water savings and water quality.
5. Environmentally-conscious purchasing.
6. School grounds.
7. School environment policy. Maintenance manuals and caretaker training.
8. Sources of timber and use of recycled materials (new buildings), ozone depleting chemicals, volatile organic compounds, harmful substances and lead-free paint. Lead piping and asbestos in existing buildings.
9. Site selection for new buildings.
10. Ventilation.
11. Integrated electric lighting and day lighting. Lighting controls.
12. Health and safety legislation. Legionnaire's disease.

Most issues apply to both new and existing buildings. All are supported with discussion, data, recommendations and references. Energy rating calculations are discussed in an extensive (if not daunting) appendix, and examples given. All in all, SEAM is a very solid document, and unlike its BREEAM predecessors, is geared to use in teaching.

At the same time, SEAM is sufficiently complex that help from professional building designers would be useful. This brings us back to architects-in-schools schemes. Involving appropriately-trained architects in these assessments would provide an excellent educational opportunity and would ensure that they are done well.

Conclusion

A passive approach to the teaching of environmentally sustainable design in schools is to allow the school buildings to "speak for themselves", where they have something to say about the issues of sustainable design. But a more active approach, which involves the critical appraisal by students of their school buildings and grounds, and in particular bringing architects into schools to assist students in conducting environmental assessments of their schools, is a powerful and effective way of creating an informed public.

Countries lacking eco-schools, architects-in-schools schemes or environmental assessment schemes may develop them by drawing on the models discussed above. And existing schemes should be enhanced, linked and promoted, with a view to placing environmentally sustainable design very firmly on the educational agenda in the future.

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RAIA: <http://www.raia.com.au>

AAF: <http://www.amerarchfoundation.com>

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