The Sustainable Design Award: Supporting 16 plus Students in Addressing Sustainable Design Issues

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Abstract

This paper outlines a new award scheme currently being trialled in nine schools in England and Wales with AS and A2 design and technology students and discusses some early feedback. The scheme's fundamental aim is to integrate thinking about sustainability into advanced level work. Students who show they have thought through sustainability issues at each stage of their coursework option will be given an award. The scheme is designed to provide students with ideas for devising design briefs and specifications from genuine, real life contexts from around the world. It is backed by a number of different organisations which will give back-up information and feedback to students throughout their AS and A2 coursework. Teachers in the pilot schools have access to a sustainability pack that helps both them and their students to tackle fundamental issues of sustainability such as reducing, recycling and reusing. The scheme is currently funded by the Department for International Development (DFID), the Construction Industry Training Board (CITB) with in-kind support from other organisations, including DATA. Over 70 schools have expressed an interest in becoming involved in the Sustainable Design Award (SDA) scheme in 2003/4.

Introduction

Sustainability is a vital issue for all educators to address, not least teachers involved in design and technology education. Design for sustainable development is a notoriously difficult area and significant efforts have been made to enable professional designers and higher education students to engage with this agenda, e.g. the *EcoIndicator 95 and 99 Manuals for Designers* developed by the Pré Consultancy in the Netherlands, the UNEP manual *Ecodesign: a promising approach to sustainable design and production* (1999) based largely on work done at Delft University, the work done at RMIT (The Royal Melbourne Institute of Technology) and published as *A Guide to EcoReDesign: improving the environmental performance of manufactured products* (1997) and the recent launch of the Demi website developed for design students in higher education by a consortium of eight UK organisations led by Goldsmiths University. Website addresses for these and other organisations are given at the end of this paper. Students at post-16 are also keen to participate but are likely to need more help to do so than professional designers or students in higher education and, prior to the emergence of the SDA scheme, no significant efforts have been made on their behalf.

Designers engaging with the sustainability agenda soon take the general idea of 'life cycle analysis' on board but quickly realised that its technical complexities make it impractical for significant use when designing. Professional designers need appropriate tools that can be accessed with the time, expertise or information that they have available. Again, design students need no less help and in reality, of course, they are likely to need more support. It is also important to note that learning by doing is the recognised approach for designers and organisations wishing to get engaged with design for sustainability. This was one of the lessons of the IC EcoDesign project, which took place in the early 1990s in the Netherlands (van Hemel *et al*, 1997). It involved about 4,500 SMEs (small and medium sized enterprises).

Following the success of Intermediate Technology Development Group's (ITDG) sustainable technology website, www.stepin.org, the Development Education Unit at ITDG was seeking ways of extending ideas on appropriate and sustainable technology into the post-16 curriculum. Discussions with teachers suggested that the only chance of success was a project that integrated the ideas into a student's existing AS and A2 Level work, without adding to the demands either for the student or the teacher. We therefore began discussions with potential stakeholders in such a project – teachers, universities, DATA and the examination boards. They were all agreed that students can have considerable problems in deciding on a coursework project, whether at AS or A2 Level. They also had difficulty finding a genuine client from whom to get advice and feedback on their ideas. We began looking at ways in which we could support those processes.

The essential aims of the scheme are:

- to enable 16 plus students in England and Wales to become engaged with sustainable design
- to enrich the current student experience in AS/A2 design and technology
- to reward students who successfully incorporate sustainable design into their AS/A2 studies.

The project strategy

The two key aspects of the strategy employed for the SDA scheme are:

- the provision of opportunities for 16 plus students to learn about sustainable design by doing
- creating a supportive structure in order to sustain the students' efforts.

Providing design opportunities and contexts

As an international charity based on the work of E.F. Schumacher (author of *Small is Beautiful*, 1973), ITDG has considerable knowledge and experience of seeking solutions to genuine technological problems in a wide variety of contexts. We believed those contexts could provide AS/A2 Level students with a genuine opportunity to design and make products that could be of real benefit to communities overseas. However, we also realised that such contexts may not appeal to some students who might want to relate principles of sustainable technology to issues nearer home. We therefore sought to develop partnerships with some of the leading lights in sustainable technology in the UK and Europe in the hope that they would be able to produce and support design contexts of immediate concern to students in their own communities. The aim was to produce a balance between southern and northern hemisphere contexts. Our discussions brought in support from the Centre for Alternative Technology (CAT), Loughborough University (UK), Amsterdam University and Twente University (The Netherlands), the Construction Industry Training Board (CITB), Dyson and Edwin Datschefski (author of *The Total Beauty of Sustainable Products*, 2001).

With such reputable and enthusiastic backing, we began to build up our ideas on design contexts and the support teachers and students would need in order to devise a brief/specification and to follow it through to making the product within the demands of the four awarding bodies' syllabi. It was decided that CAT should be responsible for the organisation of the scheme in Wales and for translating aspects into Welsh, whilst ITDG will co-ordinate the scheme in England.

So far 12 design contexts have been provided by the different partners. Teachers can use these at their discretion. Some have suggested they will use them as starting points for discussion of contexts generally. Others will offer them to students as potential contexts they might work on. Each generic context is supported by at least one exemplar as shown in the examples below.

Southern hemisphere contexts

Transportation

In many countries, working people travel by bicycle, donkey or on foot. They have to carry a variety of equipment or goods with them. Investigate the problem of carrying equipment or goods and design and make a sustainable method suitable for the transport type and the area of your choice e.g.:

- *design and make a portable carrier for use by a travelling vet (known as paravets/ wasaidizi/animal helpers and similar to paramedics in UK) in Kenya whose main method of transport is by bicycle*
- *design and make an improved bicycle mechanism for bicycle taxis used in western Kenya.*

Northern hemisphere contexts

Reduce, Reuse, Recycle

It has been recommended for many years that reducing, reusing and recycling provide many opportunities for environmental improvements in our own and other countries and in product manufacture. Design and make a product that uses at least one of those criteria e.g.:

- *a shelving system using materials that would reduce environmental impact to a minimum*
- *a system for sorting and storing materials for recycling in a domestic environment (i.e. glass, metals, plastics).*

Supporting information

Once a student has decided to consider work on a context, the teacher can use his/her discretion to suggest how they might move forward. The teacher will have access to support material (e.g. on transportation as above they would have details about the areas in Kenya, about current methods, what is transported etc.) and to the sustainability pack that contains a wealth of material on methods of thinking about sustainability in designing and making.

The development of a supportive structure

Once a student has undertaken to work on a SDA design context, they will be entered for the award by their school, which will be required to complete a very simple administration form detailing the student's name and project. This is to enable the partner organisations to know the likely demand for further support. The SDA scheme has been designed to provide support for students at four levels:

- through teacher information days
- through the provision of a Sustainability Pack
- through student study weekends and school visits
- through e-mail.

Teacher information days

Our first objective was to ensure that teachers remained central to the students' work. We had neither the desire nor capacity to take responsibility for students' progress.

Table 1: The contents of the draft Sustainability Pack.

The Sustainability Pack

1. Introduction
    - 1.1 What is the SDA?
    - 1.2 What does it offer to students who undertake it?
    - 1.3 What is involved for teachers?
    - 1.4 How does it fit in with exam board requirements?
    - 1.5 How do you enrol?
    - 1.6 How to use the SDA pack.
2. What is sustainability?
    - 2.1 Overview.
    - 2.2 Environmental, social and economic dimensions of sustainability.
    - 2.3 The ITDG perspective.
3. Starter activities
    - 3.1 An approach to introducing the concept of sustainable development with a group.
    - 3.2 Creating a culture of sustainability throughout a school.
    - 3.3 What things can be done in school?
    - 3.4 Short focused tasks.
        - What did you buy today?
        - Winners and losers.
        - Introduction to Life Cycle Analysis concepts.
        - Introduction to Appropriate Technology concepts.
        - Sustainable systems.
        - Introduction to principles of Fair Trade.
        - Simple specifications for sustainable products.
4. The toolkit for AS and A2 designers
    - 4.1 Sustainability Issues ... Clover Abbott (Loughborough).
        - 4.1.1 What is sustainability?
        - 4.1.2 The effect of globalisation.
        - 4.1.3 Consumerism and its effect.
        - 4.1.4 Manufacture abroad.
        - 4.1.5 Fair trade.
        - 4.1.6 Success stories.
    - 4.2 Companies and Products ... Gemma Carpenter (Loughborough).
        - 4.2.1 Factors influencing companies.
        - 4.2.2 Reduce.
        - 4.2.3 Reuse.
        - 4.2.4 Recycle.
        - 4.2.5 Disassembling a product.
    - 4.3 Ecodesign Tools ... Rhoda Coles (Loughborough).
        - 4.3.1 Single issue (or 'swift') approaches.
        - 4.3.2 Whole life cycle approaches.
    - 4.4 Inspirational current work ... Peter Simmons (Loughborough).
5. Design contexts
    - 5.1 ITDG.
    - 5.2 Loughborough University and E Datschefski.
    - 5.3 CAT.
    - 5.4 CITB.
    - 5.5 Amsterdam/Twente Universities.
6. Other sources of information
    - 6.1 Recommended by the Centre for Alternative Technology.
    - 6.2 Recommended by Loughborough University.
7. Appendices
    - 7.1 Criteria for receiving SDA on A/S coursework.
    - 7.2 Criteria for receiving SDA on A2 projects.
8. Other printed materials.

Therefore, we needed to make sure that participating teachers both understood how the scheme would operate and were able to support students in their thinking on sustainability. Participating schools were therefore required to send a teacher to an information day, where the scheme was explained, their role in it discussed, design contexts mulled over, back-up information considered, assessment criteria thought through and talks were given on sustainability issues and how they can be practically introduced. The structure of an information day is given below:

- What is the Sustainable Design Award? What is involved for teachers?
- How will the scheme work for a student at AS Level? At A2 Level? Tracking a student through the award process.
- Sustainability pack for teachers. The student toolkit.
- Design contexts and supporting materials.
- On-going support – the technical enquiry service at ITDG and elsewhere.
- The role of Loughborough University in design contexts and support.
- A student study weekend and school visits.

The Sustainability Pack

The intention of the sustainability pack is to provide teachers and students with immediate access to as much information as can usefully be provided in written form. The contents of the pack are shown in Table 1. The toolkit was predominantly written by current Loughborough University students, who were carefully briefed on the required content. Sustainable design literature is often written in a rather inaccessible form and having current design students as the authors was targeted at countering this tendency.

Student study weekends and school visits

A few weeks into their course the students at the pilot schools had the opportunity to attend a study weekend at either Loughborough University or CAT. They had the chance to think more deeply about sustainability and the methods that can be used to incorporate eco-design strategies into their own projects. An example of a study weekend programme is shown in Table 2. Apart from experiencing a university environment, the study weekend was seeking to develop quantitative skills, like the use of EcoIndicators, which are more difficult to convey through the Sustainability Pack. Aspects like these are definitely best learnt by doing.

Table 2: The draft structure of the study weekend for the pilot schools

SATURDAY	
Time	**Activity**
10.00-10.05	Introductions
10.05-10.10	Sustainability activity
10.10-10.30	Disassembly intro
10.30-11.00	Student disassembly
11.00-11.20	Break
11.20-11.30	Eco-indicator analysis
11.30-12.00	Student eco-indicator analysis
12.00-12.30	Student initial redesign
12.30-1.30	Lunch
1.30-2.30	Sustainability principles
2.30-3.00	Students analyse products/materials
3.00-3.15	Break
3.15-4.00	The solar lantern
4.00-4.30	Student analysis
4.30-5.30	Free time
5.30-6.30	Evening meal
6.30-7.00	Free time
7.00-7.30	Introduction to project
7.30-8.00	Groups – brainstorm
8.00-9.30	Research, discussion
9.30-10.00	Prepare presentation
SUNDAY	
9.30-10.00	Group presentations
10.00-11.00	Eco-design strategy
11.00-11.20	Break
11.20-1.00	Creativity workshop
1.00-2.00	Lunch
2.00-4.00	Project work
4.00-5.00	Group presentations

It is likely that as the scheme expands, an experience of this kind will be provided for the teachers involved rather than the students.

E-mail enquiries

In all contexts, it is surmised that the teacher will be the main source of support for the student. They will have at their disposal the packs, support materials, references, websites etc. How they use them will, as in all projects, remain at their discretion. In that sense, they will be a 'client' for the student.

However, where a student needs further support (especially in overseas projects), there will be an enquiry service available. This will be accessible in a number of different ways. There will be an SDA website, with downloadable information, plus a bulletin board where students or teachers can seek information and exchange ideas. All the information in the packs and the support materials will also be available on the site.

In addition, the supporting organisations will act as clients where practicable. Where requested and possible, they will offer advice on materials and will give feedback on design ideas as well as offering a final assessment of

how well the product meets the original need. ITDG's contexts will all be based on genuine case studies with a genuine end-user client who can be consulted if necessary. The partner organisations obviously cannot guarantee to be able to answer all queries and reserve the right not to do so if they believe the level of support being requested is unrealistic in an examination setting.

Some initial findings

Some initial indications concerning the early findings of this curriculum development project are given here, which indicate the strengths of the strategy used in the pilot and some of the areas that need to be worked on. These findings are feeding back into the development of the SDA scheme and further evaluation is taking place continuously.

The provision of opportunities for 16 plus students to learn about sustainable design by doing

Southern hemisphere (ITDG) contexts

The problems that students face in choosing a design context for their A2 project is well illustrated by this conversation between Ian Capewell (IC) and Lily Trotter (LT), a pupil at Southam College, Warwickshire, which is involved in the pilot scheme.

(IC) Background – which exam board, what level, which syllabus (graphics)?

(LT) I'm doing the Edexcel course at A2 Level in graphics with resistant materials (product design). For this course we have to produce both a 2D and a 3D product.

(IC) You've done AS level – what did you do for your coursework at AS?

(LT) For AS, I produced a limited edition CD case for Travis' first album (Good Feeling) and some promotional materials such as a poster and some postcards. Very different from peanut butter containers!

(IC) Was thinking of a topic to do for A2 a problem? What ideas did you come up with? How did you hear about SDA?

(LT) Yes, because for A2 we have to work with a company or organisation so you have to look at working with people that are easily accessible and preferably local. You are also given a list of different areas you can look at, such as interior design, company identity etc., so I was more restricted this year. It was Miss Long that came up with the idea of working with SDA, as we had looked at some of the projects on the STEP website. This appealed to me because I liked the idea of producing something for developing countries, it sounded interesting.

(IC) What was your first idea and how did it change when you came to ITDG?

(LT) Miss Long got in touch with SDA and they sent some possible A2 projects. Initially I looked at producing a de-bulking packaging kit to be used in Kenyan markets but after visiting ITDG I found it was too restrictive. So we looked at other possible projects and spoke to Mike who suggested re-packing and re-labelling peanut butter. This sounded more interesting and I liked the fact that this was an actual real problem.

(IC) So what's the design problem you've come up with?

(LT) The problem is that due to the poor packaging of local peanut butter, it has not been selling very well. People are put off because it looks low quality and will therefore spend more money buying international brands.

(IC) What sort of research have you done and how has ITDG been able to help?

(LT) I have looked at Kenyan websites mainly for market research, as obviously I'm unable to visit Kenya myself! This is one of the more difficult aspects of this

> project, as I have to be constantly aware of the fact that I am designing for people that come from a totally different background to myself. ITDG have been very helpful with this, as they are in contact with people from Kenya, so they are more aware of materials available, tastes in design etc. Any questions or problems, I can just ask, visit or e-mail!

(IC) Can we have a look at what you've achieved so far and some of the design ideas you've come up with?

Figures show some examples of Lily's current work.

Northern hemisphere contexts
All 12 of the pupils engaged in A2 projects in England have chosen to do southern hemisphere contexts, whereas the students in Wales have chosen to fit sustainability into their existing project work. It is already clear that the selection of the contexts is clearly related to the presentation and the timing of the information available but it is also clear that the ITDG contexts provide an interesting and challenging opportunity within which the students can work.

Creating a supportive structure in order to sustain the students' efforts

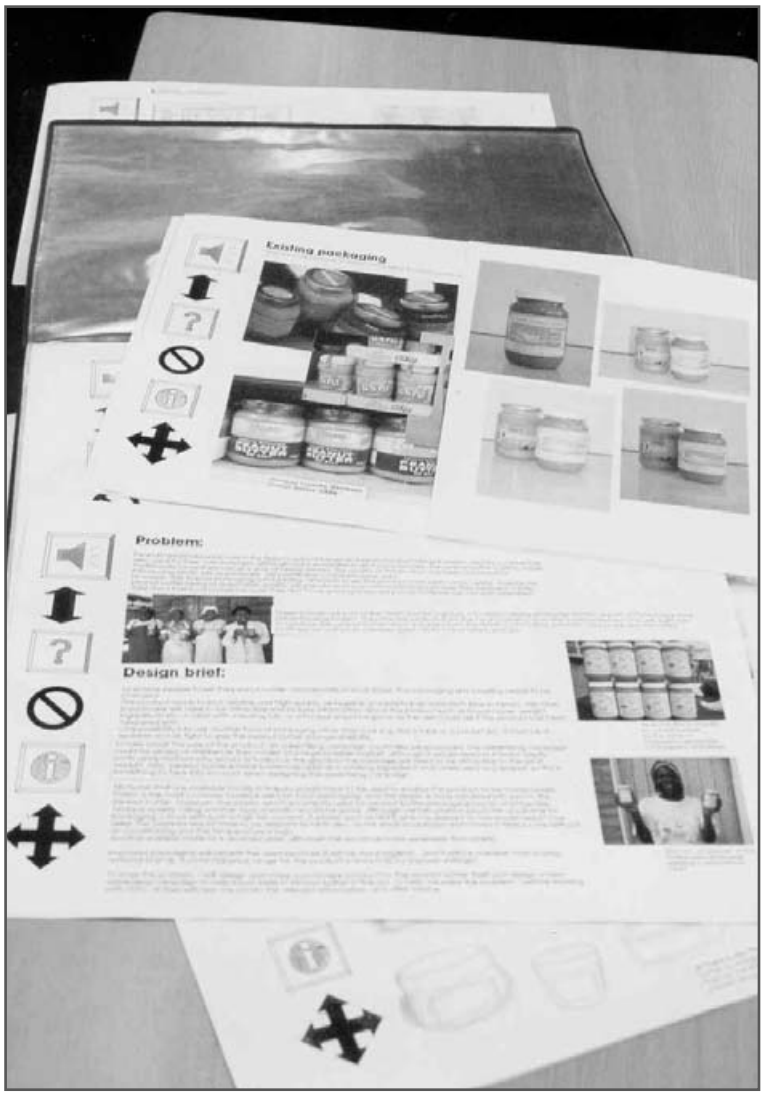
Teacher information days
Two teacher information days have been held, one at ITDG and one at CAT. Both indicated that teachers' own knowledge of sustainability issues can be quite limited and that they need considerable support before being able to deal with them effectively in the classroom. They found the sessions extremely valuable, as the following comments indicate.

'Personal knowledge has been extended into sustainable design and design criteria for a future world. It has become a well planned and exciting initiative.' Paul Cooper, Head of design and technology, Lawrence Sheriff School, Rugby.

'Cracking good session. Excellent resources and key issues presented have significantly enhanced my own views. Excellent professional development for myself. I've been reassured by the relevant close link opportunities to the AQA Product Design AS and A2 syllabi.' Keith Jones, Stoke Park School, Coventry.

The team is now looking at ways of including more detailed training on values issues and eco-design tools. Subsequent practice has also suggested more work needs to be done in explaining design contexts.

The Sustainability Pack
Teachers were provided with a pack on the



information day or at a subsequent individual session were they unable to attend. Their responses were again positive, though we have doubts about how much that initial enthusiasm has been translated into practical use in the classroom and workshop. As a result, we are now considering ways of breaking the pack down into more manageable sections and adding two student guides, one for AS and one for A2.

> 'The teacher/student guide is very valuable, especially as a resource for project work and its links to exam specifications. Delighted to be involved.' Rob Woolridge, Finham Park School, Coventry.

Student study weekends and school visits
Over 30 Midlands students attended a study weekend at Loughborough University. It proved impossible to hold a similar event at CAT so the Welsh pilot schools held in-school workshops to introduce them to sustainability issues. We learnt a lot from the Loughborough and Welsh experiences and as a consequence

Table 3: The 'Exploring problems and clarifying tasks' section of the assessment criteria.

Exploring problems and clarifying tasks

When considering a design problem and drawing up a design brief and specification you must:

- show an awareness that there are environmental implications in all designing and making activities, whatever the scale of production
- show an understanding that those implications can occur at the production, distribution, use and disposal stages of the life cycle of a product
- show an understanding that the environmental implications are multi-dimensional and potentially complex
- show thinking beyond a single environmental issue to include other ideas such as material choices, energy usage, disassembly, reuse and recycling
- show an understanding that there are potentially negative and positive social impacts in designing and making any product
- show an understanding that the balance between positive and negative impacts has been considered in drawing up the design specification
- show that the relative importance of social and environmental factors has been taken into account
- show an understanding that there are potentially positive and negative economic implications in designing and making a product
- show an understanding that economic repercussions need to be balanced against environmental and social implications at each stage of the designing and making process.

are looking at a different possible delivery next year. We are considering offering a two-day introduction for teachers, with school-based workshops on offer for students. We are awaiting feedback from students and teachers about such a design.

Some of the comments from students about their experiences are given below:

> 'It was good to look at different factors, e.g. transport costs, in our designing. It was also good to be able to discuss aspects of my individual project with some experts.' A2 Level student at Loughborough.

> 'It was OK but some of the lectures weren't relevant to my project and I would have liked more hands-on opportunities. Learning about systems for evaluating sustainability was useful.' A2 Level student at Loughborough.

> 'I learnt a lot about the effect designs have on the world but would have liked to have had the chance to actually make a product.' AS Level student Loughborough.

> 'It would have been good to have a product already disassembled, to have had some one-to-one consultancy and a lengthier design task with more time to develop ideas and review designs.'

Overall, we have concluded that AS students have found the sessions much more difficult than their Year 13 counterparts. We hope to reassess our approach in the light of more discussions with teachers before the scheme proper operates later in 2003.

E-mail enquiries
The e-mail enquiry service has been little used so far by the pilot schools, which is considered to be a positive result and reflects the success of the teacher information days, the sustainability pack and the study weekend. It is also encouraging in relation to the expansion of the scheme. If significant reliance was being placed on e-mail enquires, this might be very difficult to support as the number of students involved increased.

Getting the SDA award

Assessment criteria
The Design Award assessment criteria are included in the teachers' pack. These are designed predominantly as a checklist for students and teachers to ensure that students are thinking about sustainability throughout their projects. They are not intended as a strict mark scheme nor are they intended to replace or supplement existing examination assessments. The teacher will use them in interim and final assessments as guidelines to determine whether or not the student has considered issues of sustainability in their work and hence whether or not they will be given the Sustainable Design Award (Part 1 for AS Level, Part 2 for A2 Level). A section example of the criteria is given below.

Students would not be expected to show they have considered every criterion, but would be expected to show that those relevant to their project had been thought through.

Getting an award
Throughout the students' projects, teachers will be asked to monitor their progress in line with the assessment criteria. Students can also gain feedback from partner organisations. The teacher will be asked to consider whether a student is fulfilling the assessment criteria at stages of his/her work – in drawing up a brief/specification; when producing draft designs; when considering production methods and materials; in the production process itself. Then, in conjunction with the partner organisations, the teacher will assess whether the student's work merits an award. There will be an opportunity for students' work to be posted on the website and there will be an awards ceremony where students are presented with their awards and will be able to display their designs and products.

Evaluation and future developments

A teachers' focus group has been established to advise on the progress of the scheme and how it is working in practice. This currently involves teachers from the pilot schools, but will also involve students when they have worked on a project for some weeks. In addition, we are in regular contact with a number of advisers who include representatives of QCA and DATA, moderators from examination boards, local authority advisers and representatives of the partner organisations. All of these will contribute to a monitoring and evaluation exercise conducted by an external consultant. During the pilot year the progress of the scheme will be evaluated with a view to

making necessary changes in Years 2 and 3. During those years assessment of the impact of the scheme will be the priority, with before and after assessment of both teachers' and students' understanding of sustainability issues undertaken.

Good Practice Guide

It is hoped that the scheme will eventually become self-sustaining, with local authorities undertaking training in sustainability to the extent that it becomes an integral part of design and technology teaching, not just at AS and A2 Levels. In order to facilitate that process, we will produce a Good Practice Guide based on the experience of teachers and students during the scheme's first three years of operation. This will emphasise both good and bad lessons learnt.

How can schools get involved?

The pilot schools have now been identified and their students will be working on projects from September 2002 onwards. Many schools start their project work for A2 students well before September. Enrolment for the scheme for September 2003 will begin in spring when departments should receive further publicity through DATA and other networks. Any schools wishing to register their interest before then can contact, in England, Ian Capewell, ITDG, Schumacher Centre for Technology and Development, Bourton Hall, Bourton on Dunsmore, Rugby CV23 9QZ. T: 01926 634440, E: education@itdg.org.uk and, in Wales, the SDA Co-ordinator, Centre for Alternative Technology, Machynlleth, Powys, SY200 9AZ. T: 01654 703743, E: ann.macgarry@cat.org.uk

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Schumacher, E. F. (1973), *Small is beautiful: a study of economics as if people mattered*, Blond and Briggs Ltd

van Hemel, C. G., Bottcher, H. and Hartman, R. (1997), 'The IC EcoDesign project: results and lessons from a Dutch intiative to implement eco-design in small and medium-sized companies', in *Journal of Sustainable Product Design*, Issue 2.

Web addresses for useful publications

http://www.biothinking.com
The work of Edwin Datschefski.

http://www.cfd.rmit.edu.au
The work done at RMIT (The Royal Melbourne Institute of Technology, and published as A Guide to EcoReDesign: improving the environmental performance of manufactured products (1997).

http://www.cfsd.org.uk
For the UK's Centre for Sustainable Design which is based at The Surrey Institute of Art and Design, University College and publishes The Journal of Sustainable Product Design.

http://www.demi.org.uk
The recently launched Demi website developed for design students in higher education by a consortium of eight UK organisations led by Goldsmiths University.

http://www.pre.nl
The EcoIndicator 95 and 99 Manuals for Designers developed by the Pré Consultancy in The Netherlands.

http://www.unepie.org
The UNEP manual Ecodesign: a promising approach to sustainable design and production (1999) based largely on work done at Delft University.