Design education for sustainability

This item was submitted to Loughborough University's Institutional Repository by the/an author.


Additional Information:

- This is a conference paper.

Metadata Record: [https://dspace.lboro.ac.uk/2134/1330](https://dspace.lboro.ac.uk/2134/1330)

Publisher: © Loughborough University

Please cite the published version.
This item was submitted to Loughborough's Institutional Repository by the author and is made available under the following Creative Commons Licence conditions.

For the full text of this licence, please go to:
http://creativecommons.org/licenses/by-nc-nd/2.5/
Design education for sustainability

Dominic Clare
Goldsmiths, University of London, UK

Abstract

The demi (Design for the Environment Multimedia Implementation) project has produced a web resource to support the learning and teaching of sustainability in a wide range of contexts in design education in higher education. This is searchable and holds cross-referenced ecological information on design materials and applications; it also provides a detailed overview of generic sustainable development concepts and debates and provides opportunities for learners to navigate an extensive, refereed database on environmentally responsible design. Critical to the demi framework has been the formulation of six design principles which relate generic to specific elements.

This paper explores the definition, testing and implementation of the pedagogic framework through which it is hoped students will be critically engaged in aspects of sustainable design, influencing their design practice. It also presents the field research undertaken with undergraduate design students from 11 sites piloting the use of the web-resource during its development. The results of the research will be discussed and possible future applications in school design and technology will be considered.

Keywords: higher education, pedagogic framework, sustainability, web

Introduction

Following the Rio treaty on climate change and the European Union Fifth Environmental Action Programme in 1992, among other responses the UK Government set out the environmental responsibilities of institutions of further and higher education in the ‘Toyne’ Report (1993). As well as changes in the management of institutions, the report included requirement for the environmental education of all students in all disciplines. A review carried out in1996 showed little progress had been made (Kahn, 1996) and in the design sector in particular, Ali Kahn found that only one institution had specified a learning agenda for sustainability for all design students. In this context the demi project was proposed under the Teaching and Learning Technology Programme (Phase 3). The intention was to exploit information and communication technologies (ICT) to produce a teaching and learning resource, promoting sustainability for design students and supporting their design decision-making. In this paper, the term ‘sustainability’ will be used where sustainable development refers to ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Bruntland, 1987) and sustainable design pursues sustainability as a key objective.

The demi project started in September 1998 with a consortium of academic institutions, national design sector organisations, and the CTI for Art and Design. The project team engaged in sector-wide consultation and collaborated in the formulation of the Sustainable Learning Agenda for Design Education (Kahn, 1999). This formed the starting point for the development of the framework which specified the demi web resource. The level of response from higher education design again highlighted the low priority given to sustainability in the sector.

The aims of the demi project were:

- ‘to establish an appropriate demi learning specification for the HE design sector…
- to develop appropriate demi resource content and inter-relationships in order to establish information resources with multiple access levels and pathways for learners
- to develop and integrate suitable technology-based teaching and learning delivery methods and ... to provide learners with appropriate, dynamic and active access to and through the
resource and support teachers in integrating this in their teaching
■ to disseminate the project outcomes to the HE design sector

Sustainability concepts

| need for precaution | value of diversity | interdependence of major systems | needs and rights of future generations | limits to growth |

Sustainability debates

| design debates | the natural environment | assessing the environment | environmental problems | human sustainability activities |

Figure 1: demi Framework – generic elements (after Dewberry and Fletcher, 2001).

Design applications

<table>
<thead>
<tr>
<th>fashion and furnishing</th>
<th>transport</th>
<th>electronic products</th>
<th>buildings</th>
<th>packaging</th>
<th>other</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>types of application</td>
<td>lifecycle focus</td>
<td>consumer issues</td>
<td>comparing</td>
<td>policy and trade &amp; alternatives</td>
<td>labelling</td>
<td>ethics</td>
</tr>
</tbody>
</table>

Design materials

<table>
<thead>
<tr>
<th>textiles</th>
<th>timber</th>
<th>polymers</th>
<th>composites</th>
<th>metals</th>
<th>finishes</th>
<th>other</th>
</tr>
</thead>
<tbody>
<tr>
<td>types of material</td>
<td>lifecycle focus</td>
<td>consumption issues</td>
<td>comparing</td>
<td>policy and trade</td>
<td>alternatives</td>
<td>labelling</td>
</tr>
</tbody>
</table>

Gallery (examples of designers’ work)

Figure 2: demi framework – specific design elements (after Dewberry and Fletcher, 2001).
The demi framework

A number of design practitioners have been leading lights in the movement for sustainability. Buckminster Fuller, Victor Papanek, Ezio Manzini (see, for example, Fuller, 1978; Papanek, 1967; Manzini, 1994) and others have made significant contributions to the development of sustainable design and design education, however, a survey of the sector shows the penetration of sustainability issues into core design curricula has been extremely limited. In the absence of an existing agreed and tested scheme the demi team, with a wide range of design educators, have developed a framework. This identifies and relates generic concepts and debates on sustainability to specific information about applications of sustainable design, materials and examples of designs. The generic elements have been developed from current practice in design programmes. Both have been tested for validity, coherence and breadth of application with colleagues from across a range of higher education design contexts.

Initial research across the sector confirmed that these specific and the generic elements were not explicitly related except in isolated examples where individual tutors had adapted and created materials, lectures or studio support, or individual students had identified sustainability as a personal focus. Where sustainable design was identified as a course element, this was most often ‘bolted-on’ as a particular design project focus. Additionally, a small number of programmes included a lecture or lecture series on sustainable design, often optional, within contextual courses. An even smaller number of departments claimed to integrate sustainability throughout programmes.

This situation prompted the need for a widely applicable framework that clearly related generic and specific sustainability elements in a way that was meaningful and engaging to design students. In the demi framework these links have been termed design principles, which seek to interpret the wide ranging, generic debates and concepts for design students in appropriate and relevant ways. This has necessarily been developed into more than a convenient mapping of information. Existing information was rarely in an appropriate form; the design principles required defining and there was the need for the framework to lead to an ICT resource designed to promote active learning.

The framework describes a curriculum and includes pedagogic aspects. The network of links between nodes of information and thus the journeys learners take between elements are as important as the information itself. It is also possible for journeys to begin and end at any points in the framework. The web resource through which the framework has been realised is intended to mediate the active involvement of students in taking these journeys and includes attributes of Grabinger and Dunlap’s Rich Environments for Active Learning (1995), in that it has the potential to:

- promote study and investigation within authentic contexts
- encourage the growth of student responsibility, initiative, decision-making and intentional learning
- utilise dynamic, interdisciplinary, generative learning activities that promote higher order thinking processes to help students develop rich and complex knowledge structures

The intention was that students looking for particular information would be enticed to investigate

<table>
<thead>
<tr>
<th>Appropriateness</th>
<th>Choosing the right solution</th>
<th>e.g. not using high quality materials for disposable products.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td>Fairness within and across all systems.</td>
<td>e.g. being sensitive to inequalities that exist.</td>
</tr>
<tr>
<td>Systems</td>
<td>Connections between society and nature.</td>
<td>e.g. permaculture.</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Doing more with less.</td>
<td>e.g. by promoting product sharing.</td>
</tr>
<tr>
<td>Scale</td>
<td>The right size from the right place involving the right people.</td>
<td>e.g. local vs. global, conserver vs. consumer.</td>
</tr>
<tr>
<td>Sufficiency</td>
<td>Knowing how much is enough.</td>
<td>e.g. acknowledging the differences between needs and wants.</td>
</tr>
</tbody>
</table>

Figure 3: demi design principles of sustainability (after Dewberry and Fletcher, 2001).
issues of sustainability related to their particular search. The intention was that through repeated, useful and interesting engagements with the learner-centred framework; consideration of sustainability at all stages of design practice would be encouraged. With a high quality of presentation using a variety of media and the dynamic use of links within the resource to relevant, refereed external sites, students will better be able to develop a perspective on designing that fundamentally incorporates sustainability.

It was anticipated that in their studio work, the immediate concern of students was for quick access to accurate information on materials or applications, or to examples of other designers’ work. Similarly, in contextual studies, quick access would be required to relevant concepts and debates. These were seen as initial entry points to the framework and the intention was to provide students with meaningful encounters with relevant sustainability issues as they navigate the complex network of links and nodes from these starting points.

Research

This paper deals only with the research undertaken with undergraduates using trial versions of the web-resource focusing on the learning opportunities. The purpose of this being to distinguish aspects of the framework, in the form of the web resource, identified by the students as supportive of learning and teaching, usable, effective and considered valuable.

The data gathering took place between October 2000 and April 2001 in 11 higher education institutions across the UK and involved 120 undergraduates. One programme was selected in each piloting institution by tutors as the focus of the research. This gave a range of student groups for the evaluation from years/levels 2 and 3 across a range of design contexts (Table 1).

The learning and teaching took place either in studios or lectures. The studio-based design projects led to assessed outcomes as exhibited works; including individual and group projects based on project briefs that were sustainability-focused or included sustainability-related criteria. The lecture-based contextual studies had essays as assessed outcomes. In some courses, the pilot demi web resource was recommended to students and in others its use was made compulsory. In two courses, the use of the web resource was incorporated in assignment criteria.

Following students’ use of the web resource data was collected as field notes from semi-structured group, interactive interviews in semi-formal settings and with all participants explicitly encouraged to contribute. It was recognised that students might be reluctant to report negatively and responses might follow existing practice mediated by social relationships.

The aspects dealt with in this paper relate only to the schedule questions on the usefulness of the web resource to the students in terms of their design disciplines; the usefulness in addressing issues of sustainability; reference to generic issues; the types of work the web resource supports best and an overall assessment.

Results

Students overall responses to the web-resource were positive (see Table 2).

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very good or very useful</td>
<td>8 (approx. 85 students) groups</td>
</tr>
<tr>
<td>Good</td>
<td>3 (approx. 35 students) groups</td>
</tr>
</tbody>
</table>

Table 2: Students’ overall assessment of the framework.

The web resource was described as: well-structured, high quality, in-depth, a large-scale information source, too reliant on text, needing more images.

It was seen as: valuable, a one stop shop for information on sustainability in design, having useful and validated links to other useful information, lacking a glossary or index.
The web resource was considered:
interesting, challenging, motivating.

Most criticisms related to the design and use of
the trial user interface and the lack of a printing
function.

The most likely application identified by students
was in research, particularly for essays.

The parts of the web resource considered most
useful were, equally:
materials, applications, the gallery, the
design principles, debates, generic issues and
the life cycle approach.

**Discussion**

Students were positively disposed to the demi web
resource, although issues concerning the degree
that responses were authentic in the face-to-face
interview are important. Students were motivated
to use the web resource to support their studies in
self-directed ways, at least initially with clear
intentions in mind. Particular aspects of their
experiences do not follow obvious patterns with
lecture and project contexts dispersed fairly even-
ly. Students saw most value in using the web
resource for research for essays or projects. The
quality of the content and the validation of exter-
nal links were cited as particular strengths as was
the ‘one stop shop’ nature of the web resource.
Most criticisms related to the user interface, with
more use of images recommended widely. The
need for more interaction was also referred to, as
was the need for printing.

Across the student groups, all aspects of the
framework were considered valuable, and within
that the gallery of designers’ work was the most
widely cited. This and the positive response from
students who had undertaken successful journeys,
at least in terms of not getting lost or stopped,
indicated that the framework allowed the antici-
pated range of uses. The research shows signs of
students investigating sustainability in a self-
directed way through which they accessed the
information they were seeking but also did
engage in other, further aspects of sustainable
design extending their learning. In some cases
they discovered new perspectives, one student
reporting the discomfort generated when she
explored generic issues linked from a specific
design-focused query.

It is important to make the point that the research
here does no more than give support to the frame-
work developed as a model for communicating
and interrelating a complex knowledge structure
in a way that is accessible to students. The ambition
of the project is to use this to embed notions of sustainability in students’ design practice
inspired through the use of Environment for
Active Learning. Measuring a shift in culture is
notoriously difficult and detecting any impact on
practice is a long-term endeavour if at all possible
in the higher education context. What is
inescapable is the need for a shift in design edu-
cation in its incorporation of issues of sustainabil-
ity. The work of Fuller, Papanek and Manzini list-
ed above show the potential in the sector and leg-
islative imperatives are forcing the change. It is
hoped the demi web resource will have a role in
encouraging students and their tutors to become
proactive in these changes.

The demi framework has possible wider applica-
tions in design education as well as refinement at
undergraduate level. Initial discussions with
school teachers and their post-16 students support
this. Future work is planned to use the web
resource to support GCE A’ Level design activi-
ties, providing contextual information and also a
stimulus to explore wider sustainability concerns.

**Acknowledgement**

demi has been funded by the HEFCE Teaching
and Learning Technology Programme (Phase 3),
the consortium includes higher education institu-
tions: Goldsmiths, University of London (lead),
Falmouth College of Art, Open University, Surrey
Institute of Art and Design, the University of
Brighton and the Learning and the Teaching
Support Network Centre for Art, Design and
Communication; and Design sector organisa-
tions: Design Council, Forum for the Future and
the Royal Society for the Encouragement of Arts,
Manufacturers and Commerce.

**References**

Report*, London: HMSO

Ali Kahn, S. (1999) *Department for the
Environment, Transport and the Regions and
Forum for the Future Paper – Sustainable
Development Education: Design specification*,
London: HMSO

Dewberry, E. and Fletcher, K. (2001) *Internal Project Documentation*


Manzini, E. (1986) *The Material of Invention*

Papanek, V. (1967) *Design for the Real World*


