DEMI: LINKING DESIGN WITH SUSTAINABILITY

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Abstract

This paper describes an educational framework offering one possible approach to linking sustainability and design. This framework, developed as part of the demi project, provides links to information new to designers thereby challenging the design status quo. For example, it incorporates the integration of different communities within designing - often from outside traditional boundaries - and an appreciation of environmental and social impacts as designs are conceived, produced, used and then discarded. The paper discusses the demi framework, its content and its educational potential. Further, it explores the possible transferability of the framework to other disciplines, promoting practical and widespread action in education for sustainability.

Keywords

sustainability, education, design

Introduction

The demi project[1] (**d**esign for the **e**nvironment **m**ulti-media **i**mplementation) is funded by the UK's Teaching Learning Technology Programme (TLTP). The aim of demi is to explore and expand on the UK Government's Sustainable Learning Agenda for a UK Higher Education (HE) design audience and develop a learning experience that integrates sustainable thinking into design curricula. The outcome is a resource delivered on the World Wide Web which connects and forms alliances between designers and their everyday practice and issues as broad ranging as aesthetics, fuel poverty and climate change.

As sustainable development is built on connections and correlations between Nature, society, theory and practice, education in sustainable development has a major requirement for the drawing together of ideas, and for a parallel movement away from the partial perspectives and incomplete views which frequently are a product of strict disciplinary boundaries and atomised thinking. This paper is concerned with an educational approach which prioritises connected, non-mechanistic thinking and where practice and theory are viewed as mutually supportive actions promoting sustainable development. These educational issues are explored here in the context of the demi web-resource addressing design for sustainability in the UK Higher Education (HE) sector.

The importance of design as a force for sustainability has grown out of the realisation of its major role in determining the resources that are consumed: it is estimated that decisions made in design are responsible for eighty to ninety percent of a product's environmental and economic costs (Graedel et. al., [1]). Yet considerations of sustainability are rarely integrated within design curricula in the UK — and when they are they tend to be explored in a one-off, stand alone project or introduced as an 'add-on extra' to a design brief (Design Council [2]). The demi project aims to support an alternative sustainability-related educational experience to this by making sustainability (rather than design) the starting point for any exploration. This has the effect of promoting a broad view of design and one which can be seen both to influence and be influenced by consumption, people's needs, communities and international policy, among other issues.

Background to sustainability initiatives in UK HE design education

Most current sustainability-related initiatives in UK HE (such as the HE21 programme[2]) make reference to their being influenced by the Toyne Report (Department of Education [3]). The Report contained the recommendations of an expert committee which examined the state of tertiary level environmental education in the UK. It concluded that FHE had an indispensable role to play by providing, among other issues:

- specialist courses leading to specifically environmental qualifications;
- course 'updates' for those already in the workforce; and

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[1] demi is a three year TLTP-funded consortium project. Its membership comprises: The Design Council; Falmouth College of Arts; Forum for the Future; The Open University; The Royal Society for the Encouragement of Arts, Manufacturers and Commerce; Surrey Institute of Art & Design, University College; University of Brighton; and Goldsmiths College, University of London. The demi web-resource can be found at http://www.demi.org.uk

[2] The aim of the HE21 programme is to generate and promote best practice for sustainability across the UK higher education (HE) sector. More information can be found at http://www.he21.org.uk/project.html

- environmental education for all students, whatever their specialist subjects of study.

In 1996 a Review of progress on the 27 recommendations of the 1993 Report was undertaken (Ali Khan [4]) and its conclusion revealed that very little progress had been made. In the design sector, for example, it was shown that one institution alone had specified a learning agenda for sustainability relevant to all students. The indifferent response of the design sector to the original Report gave rise to a further Government paper, *Sustainable Development Education: Design Specification* (DETR and Forum for the Future [5]) which identified three main areas of focus in the development and implementation of sustainable development education strategies: sustainability concepts; sustainability solutions; and effective teaching. Thus it can be seen that this Specification sets down the need for an educational process in design for sustainability embracing both methods and content.

While both methods of teaching and course content are well established in design and are becoming increasingly better established in sustainability (as two distinct subject areas), information and pedagogical approaches appropriate to their amalgam, design for sustainability, are still in their infancy. Interestingly, when pedagogy is considered, both sustainability and design share many similarities of approach. The teaching principles and practices of sustainability education, according to Ali Khan [6], are based in participation and mutual learning and have an deep implied sense of inter-disciplinarianism. The Association of University Leaders for a Sustainable Future [7] extends this further and stresses the importance to sustainability education of skills and knowledge of both defining problems holistically and analysing them from multiple perspectives. Likewise, design pedagogy employs approaches which include: creative, solutions-focused learning; self-directed team work; learning by doing (commonly ʻliveʼ projects); iterative refinement and reflection; and, developing research and interpretation skills drawing on multiple sources. The level of similarity of these two teaching approaches perhaps suggests that an entirely new pedagogy need not be developed for design for sustainability, however there are some important additions that would need to be made to such a pedagogy like, for instance, a greater emphasis on life-long learning and in generating local community projects.

As reflected on above, considerations of sustainability are rarely integrated within design curricula in the UK and on the occasions where they are incorporated they tend to be tagged on to an existing brief. While this is one way to approach education in design for sustainability, we would argue that there are a range of possible approaches, likely extending along a continuum, where the two extremes are characterised by different contexts or starting points for viewing this subject area (see figure 1). At one end is a design context, where sustainability is ʻunderstoodʼ within the frame of reference of current design activities and priorities, i.e. bringing a product, service or system to the market place (this is where most current educational practice focuses its attention). At the other end of the continuum is a sustainability context. Here design is viewed as a dimension of sustainability (rather than sustainability being viewed as a dimension of design as at the other extreme) and draws on sets of backgrounds, expectations, priorities and outputs in accordance with the goals of sustainability. This expands the boundary of what design is, what it does and also who is involved by drawing on dialogues, individuals and

groups from outside design's traditional confines. This more 'global' perspective maximises the potential of design thinking to influence the environmental and social impact of goods and services.
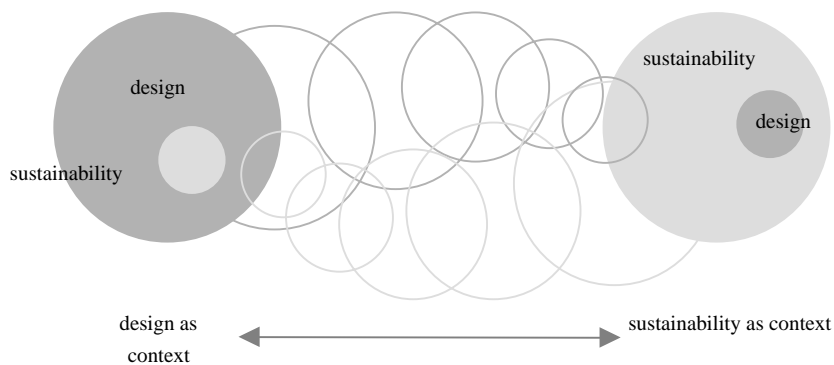

Figure 1 Range of possible starting points for education in design for sustainability

This more inclusive starting point for demi which challenges intellectual narrowness and pigeonhole thinking, allies with the work of David Orr [8] who links the, 'the great ecological issues of our times' with educational in-the-box practices and 'our failure to see things in their entirety' This lends demi an explicit mandate to promote interconnectedness, evident on a number of levels. Firstly demi brings together information on design and sustainability. This information covers a broad range of subject areas and varies from the general to the particular (this is discussed in more detail below). Secondly, demi tries to avoid the jargon of both the design and the sustainability debates and present information in an accessible format. Thirdly demi seeks out links across information and represents these links as 'essential pathways' to encourage learners to navigate through the web-resource and enrich their learning experience. Fourthly, it draws on information presented in multiple media, including text, images and film to help create new ways in which sustainability can be viewed and understood. Lastly, demi provides an interface for design for sustainability information on the Web building relations between diverse sets of information, people, places and projects.

The demi project in more detail

The primary audience for demi is the higher education (HE) design community, both staff and students. It is envisaged that, because design for sustainability is a new subject area, both staff and students will approach demi as learners. While staff may for example, look to demi to help frame up design projects, students may explore the site in order to address particular design problems. The UK HE design community includes a wide range of design disciplines, from product engineering and architecture to craft-based subjects like silversmithing and jewellery. Thus the remit of demi is extremely broad in line with the dominant philosophy within sustainability education.

The framework of design for sustainability information encapsulated by demi is best described as complex and dynamic. Traditional methods of information delivery in education (books, journals, video) often require resources to be complete before the user interacts with them and are subsequently not easily revised. In the case of demi, this static delivery method is not particularly suitable primarily because of sustainability education's requirement of responsiveness to real events and knowledge. Thus the flexibility inherent in the Web along with free access issues (both nationally and internationally) provides the preferred teaching and learning context.

As demi addresses the design dimension of sustainability, it links both formal and informal information from outside the remit of traditional design. Formal links to disciplines such as ecology, development studies and economics support this sustainability context. At the same time, less formal information such as that found in community and environmental groups provides further insight. The inclusion of this information necessitates a change in the traditional way in which design is bounded so that the experience, knowledge and motivation of new and different communities is encouraged.

The demi framework

The demi framework connects two bodies of information via a series of links. These links have been termed the demi principles. The information in both bodies is about sustainability, however one focuses on generic debates relevant to all fields of study and the other on debates specific to design. The demi principles act as an interface between both sets of information, on the one hand providing a sustainability context for design decisions and on the other, making sustainability concepts tangible through design output.

The framework can best be described with the metaphor of a tree. At the base of the tree is the root system. This supports the tree's development and stability and provides the vehicle for nourishment and the potential for growth. The generic information contained within demi has similar traits to the tree roots: it provides a broad overview of sustainability concepts and helps direct and generate directions for specific focus within individual disciplines. This generic information includes a section on wide-ranging debates such as ozone depletion and a section on sustainability concepts identified in the Design Specification of the Government's Sustainable Development Education Panel (DETR, Forum for the Future [9]). These are:

- an understanding of the inter-dependence of major systems;
- an understanding of the needs and rights of future generations;

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- an understanding of the value of diversity;
- an appreciation of the need for precaution; and
- limits to growth.

These sustainability concepts are interpreted from a design perspective in the demi principles. The principles are based on both primary and secondary research and were tested for terminology and content on a diverse group of international experts in this subject area. The resulting demi principles redefine the sophisticated arguments and complex ideas embedded within sustainability in six more tangible, design-specific terms: efficiency; sufficiency; equity; systems; appropriateness and scale. In the framework, these are explained both by definition and example, with a wide range of case studies making the guidelines practicable. It is likely that these terms will evolve as a result of developments in this relatively newly formed subject area.

Continuing with the tree metaphor, linking the roots with the branches is the sturdy trunk. Solid and strong, it is the conduit for nutrient flow from roots to branches and branches to roots — it continually responds to both parts of the tree and thus maintains an overall view of the whole system. This channel in demi is the design principles. They help facilitate the integration of often complex sustainability thinking into design theory and practice. The design principles act as context for, and connections to, the design-specific body of information.

The branches of the tree stem from the trunk. They are exposed to the elements and their growth is dependent on nutrient flow and external conditions. Growth and development is manifest in the quality of leaves and fruit the tree bears and these ỏisible indicatorsỎ provide clues to the well-being of the tree. Similarly, the specific information in demi — and how this information is used — is an indication of how sustainability is translated to discipline-specific content. Specific design for sustainability information is the branch system which spreads its boughs across traditional design landscapes, inspiring new horizons for the scope and nature of design output. This body of information includes data on the development of ideas, methodologies and classifications in design for sustainability, individual material and product types (for example, textiles, timber, transport, buildings, electronics etc.) and on project work and case studies informing design for sustainability.
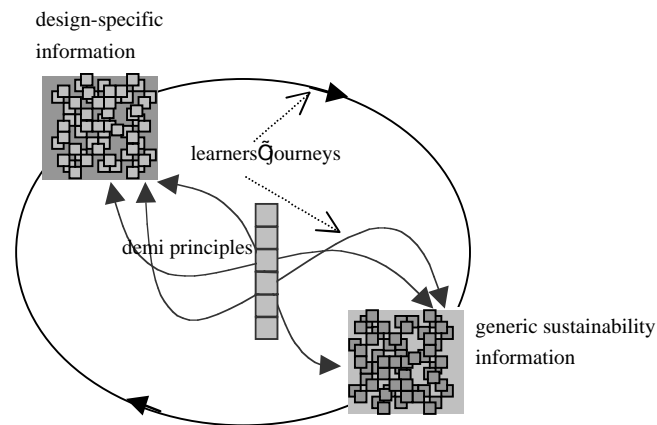
Figure 2 The demi framework

The framework allows a user to access the information embedded in demi at any point. This may mean that starting points vary from information about 'soil' to 'appropriateness in design' to 'energy consumption in the production of 1kg of glass' The different scale and scope of this information is essential to understanding the diverse nature of both sustainability and design for sustainability. In terms of the content that fills the framework, there is great variance in the quantity of information available on different design approaches or resource types. This means that in some parts of the structure, there will be extensive and specific information (particularly with regards to materials, for example), while in others, information gaps exist (such as with design approaches focusing on alternative ways of satisfying needs). Importantly, these gaps are considered to be crucial to the framework as they highlight new areas for research and development within the field. Just as the existence of information is an indicator of the origins of design for sustainability thinking, the information 'black holes' suggest possible new directions in which the field may travel.

A key consideration in the design and build of the demi framework is its potential transferability to other subject areas. The ability to successfully transfer the framework across disciplines is thought likely to lead to speedier and easier implementation of sustainability principles in other fields of study, ultimately promoting a shared vision on sustainability. Two elements of transferability in demi were examined. The first was content and the second, the structure of the framework itself. In terms of content, the body of information representing the generic sustainability debate is seen to be implicitly portable and relevant to other subjects. In terms of the framework's structure, the specific and generic information sets and the links between them are likely to be highly applicable to other subject areas. The links themselves are subject-specific. However what they represent — a distillation of sustainability concepts from the perspective of a particular subject — is universal. Hence the framework, as illustrated in Figure 3, is a type of 'generic footprint' with a part shared content.
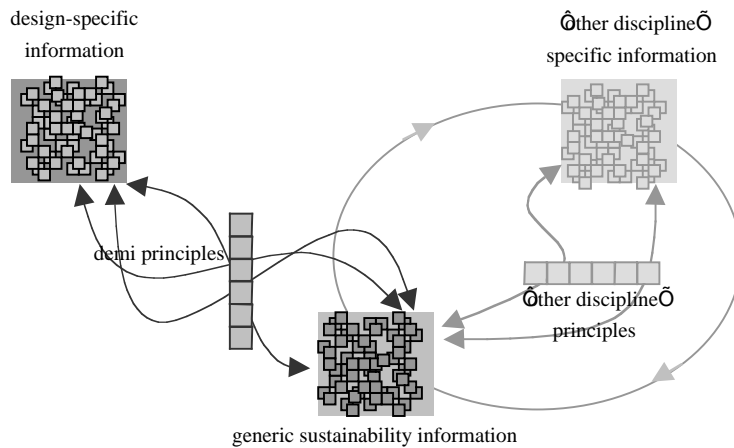
Figure 3 Potential transferability of the demi framework

Connecting knowledge

The connections made within demi are of particular importance in providing the learner with access to a range of relevant information. Connections are both internal (across the different sectors of demi) and external (linking the learner to other web-sites and resources). The internal connections operate through a series of keywords. Each keyword (either present in the text or relating to the subject matter in some other way) has been carefully chosen to provide coherency, linking diverse knowledge from across the demi web-resource. For example, a learner reading about the value of diversity in the sector on Õsustainability conceptsÕ will be sign-posted to debates on forests, extinction, habitats and food. If the user clicks ÔforestsÕ a number of further links appear in the sectors on debates, materials and principles, representing essential pathways the learner can explore. Linking different information together through the use of keywords provides the learner with a range of views on a subject (a learner-centred pedagogy). The external links from demi draw on relevant web-sites which enhance and support the information presented. These, together with other resources such as books, journal articles and organisations lend validity to the demi web-resource and also make appropriate use of the Web.

Using demi

The demi web-resource has been piloted over the last year by upwards of 500 design students from UK HE drawn from a wide range of disciplines. It has been well received and it has been commented that a resource like demi is particularly relevant in the current climate of growing interest in sustainability. Feedback was sought from tutors and students with notably similar responses: both groups found the demi web-resource to be a useful tool to either frame lectures, essay questions and projects or to answer them; both groups wanted the visual language and navigation processes of the web-resource to be refined to enhance clarity and ease-of-use; and, both groups wanted to see the web-resource showcase student work and best practice projects. It appears however that while demiÕ status as a web-based project remained unquestioned, it became obvious during piloting that the majority of UK design courses are not yet geared to delivering web-based material in the studio (where most design activity takes place). This is seen as a major factor limiting the way demi is currently used:

rather than being integrated within design practice, it is used more as a research aide in a library or computer suite. This raises important questions about the potential to integrate sustainability through e-learning when the tools which deliver this information are remote both from the core teaching environments and methods. In the example of demi this remoteness can be found to be geographical (no computers in design studios), methods-related (the Web is not yet formally used as an educational resource) and philosophical (the subject area is new, different and challenging to design).

Conclusions - future directions

This paper describes one example of integrating sustainability thinking within a particular subject area. The demi web-resource draws together design issues in the context of sustainability and in so doing responds to UK Government guidelines on this issue. The structure of the framework is well defined but its content is not prescriptive. It allows user ownership of navigational routes and information and encourages interaction across the web-resource.

While demi has been developed for learning and teaching within design, a key consideration throughout its evolution was how this experience could be transferred to other disciplines. In particular this has focused on transferable aspects of the learning framework, providing a tested and coherent approach to integrating the diverse and complex information that is sustainability.

The development of learning networks like demi will hopefully inspire a range of educational experiences, making maximum use of latest technologies to promote awareness and foster a sense of understanding and common goals.

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