



Mini project

# Socio-centric sustainable design – the development of a learning resource



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## **Abstract**

*This report reflects on a mini-project undertaken at Bournemouth University (funded by the Higher Education Academy Engineering Subject Centre) on the development of a web-based learning and teaching resource specifically aimed at the socio-centric dimension of sustainable design. The resource can be found at [www.sociocentricdesign.com](http://www.sociocentricdesign.com). A literature review was undertaken which focused on the socially related aspects of sustainable design and enabled the components required to understand this aspect of sustainable design to be determined. An understanding was also developed, namely that incorporating the socio-centric aspect into design requires that the final design is left as late as possible. Consideration also needs to be given to the design's purpose and its effects on the user, the community and society as a whole.*

*An evaluation of existing web based resources on sustainable design is also presented. However, the focus is on the outcomes learned from the collection of primary data informing both the development of the resource and an evaluation of the outcome.*

*This report sets out the content, arrangement and web-interfaces for the new learning and teaching web-based resource which focuses on the socio-centric dimension. This clearly indicates the need for a high level of interactivity in the web-interface.*

Keywords: sustainable design; online learning; sustainability; product design; design education; socio-centric

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## **1. Introduction**

This report reflects on the development of a learning and teaching resource aimed at undergraduate designers and engineers to assist them in understanding the third of the three dimensions of sustainable design, namely the socio-centric dimension.

It sets out in some detail the content, arrangement and web interfaces of a new learning resource that has been developed as part of a Higher Education Academy Engineering Subject Centre-funded Mini-Project. The resource can be found at [www.sociocentricdesign.com](http://www.sociocentricdesign.com). This research develops an earlier study reported by Humphries-Smith (2008b) which considers how sustainable design is or should be integrated into the design and engineering curriculum.

### **1.1. Aims and objectives**

The aim of the study was to provide a resource which can be used by engineering and product design students to enable them to form a better understanding of human expectations and aspirations, namely the socio-centric dimension, with respect to solutions to sustainable design problems.

The objectives of the study were determined to be to:

- define the socio-centric dimensions in detail
- evaluate the existing learning and teaching resources for sustainable design with a focus on web based tools

- develop a web based teaching tool that is focused towards the socio-centric dimension of sustainability
- evaluate the learning and teaching resource.

## 1.2. Background

Madge (1997) and Dewberry and Goggin (1994) provide comprehensive histories and definitions of sustainable design. Madge (1997) states that sustainable design is “also the study of needs and ethics, of current and future technologies, of sociologies, consumer behaviours and environmental impacts and improvements” (p53).

The Royal Academy of Engineering report introduced the requirement to have three dimensions, the eco, techno and socio-centric dimensions in order to achieve true sustainability (Dodds and Venables, 2005). Clearly there are a range of approaches, tools and techniques that have been developed within each of the three dimensions.

All of the concepts within the socio-centric dimension point to the need for designers to take an interdisciplinary approach when working in the socio-centric dimension, which is defined as ‘Human expectations and aspirations – the needs of human beings to live worthwhile lives’ (Dodds and Venables, 2005). It also requires designers to work with psychologists, biologists, chemists, ecologists and sociologists so that problem solutions are found that are beneficial to the user but also to the wider community and environment.

The need to embed sustainable development in all HE curricula was established by HEFCE in 2005 and the Engineering Council UK (2005, p11) now requires all professionally recognised engineers to “undertake engineering activities in a way that contributes to sustainable development.” Thus, those educating engineers and designers must address sustainable design in the curriculum. The difficulties of doing this should not be underestimated and are reported upon elsewhere by Humphries-Smith (2008b) and Ramirez (2006, 2007).

It was in this context that a Masters project with the aim of determining outcomes for the first two objectives was conducted by Franziska Conrad at Bournemouth University.

## 3. Methodology

A qualitative based research methodology was used in order to collect a rich data set that included data on opinions, feelings and preferences.

The data collection took place in two stages. Stage 1 was designed to determine the existing level of knowledge of undergraduates about sustainable design and also to gain feedback on existing web based resources on sustainable design. Stage 2 was designed to gain feedback on the new web based resource developed as a result of this research.

### 3.1. Stage 1

A survey method of data collection was chosen due to the fact that the data had to be collected over a short period of time and the completion could be organised electronically, allowing the respondents to complete the survey at their convenience. Thus a small, but representative, sample group was used. The members of the sample group used were all (third (industrial placement) or final year) undergraduate students on a range of design/engineering courses at Bournemouth University. The rationale for this was that the web based resource was to be designed for use by undergraduate design and engineering students, which clearly the sample group represent. Additionally, the nature and extent of input on sustainability received by these students was known.

The survey was a two part process. Initially respondents were asked to answer the following three questions:

1. What is your understanding of Sustainable Design?
2. What would you be looking for in a design tool that is meant to help you integrate sustainability into your design process?
3. Sustainability is generally considered to be based on three dimensions, the ECO-centric, TECHNO-centric and SOCIO-centric dimensions. What do each of these mean to you?

The respondents were then asked to look at two websites, an eco-design resource at [www.informationinspiration.org.uk](http://www.informationinspiration.org.uk) and [www.ecobarkingcrickets.org](http://www.ecobarkingcrickets.org) (otherwise known as the

Sustainable Design Portal). They were then asked to complete five further questions (via two separate discussion groups, one each for third and final year students, set up on Facebook.com):

4. Is the InformationInspiration website a helpful tool for designers interested in the integration of sustainability into the design process? Please explain your findings.
5. How accessible are the design tools provided by the website?
6. Would you be able to use/incorporate these tools into your design work?
7. If you could add more information to this site what would it be?
8. How does the Sustainable Design Portal compare to the InformationInspiration website? Please consider content as well as website design.

There were a number of limitations to this study. As an unsupervised survey there was a lack of control over who from the sample group responded and, as with all questionnaires, the time required by participants was a potential barrier, taking 30-45 minutes to compare the two websites.

### **3.2. Stage 2**

Once the [www.sociocentricdesign.com](http://www.sociocentricdesign.com) website became live, final year students on the BA/BSc Product Design programme were invited to evaluate the site via a blog setup on Bournemouth University's "myBU" virtual learning environment. It should be noted that these participants had been respondents as second year students to an earlier study reported in Humphries-Smith (2008a). They were not the students who had responded in Stage 1; however, they had had exposure to the same two websites previously, and they should have a higher level understanding of sustainable design than the Stage 1 respondents. The use of a blog tool as a data collection method was chosen because historically students have been found to respond well to this type of technology and because it encourages the expression of opinions as well as discussion, thus potentially producing the type of data required by this study.

The students were specifically asked to comment upon the following aspects of the website:

1. Is the website a helpful tool for designers interested in the integration of sustainability into the design process? Please explain your findings.
2. How accessible is the information provided by the website?
3. Would you be able to use/incorporate these theories/ideas into your design work using the information provided on the website?
4. If you could add more information to this site what would it be?
5. Is there sufficient interactivity to make site engaging? If not, what else would improve it?

## **4. Results**

### **4.1. Stage 1**

#### **4.1.1. Responses from students**

The detailed results of Stage 1 have been published elsewhere (Conrad and Humphries-Smith, 2009), thus only a summary will be provided here.

The initial questionnaire of three questions was completed by 40 third year students and 15 final year students; the evaluation of web based resources was completed by eight students. Generally, third year students demonstrated a much better level of understanding than final year students. Most of the responses suggested eco-design orientated content, such as suppliers, material and manufacturing information and current/future technologies, was what was generally being sought. In terms of interactivity, there was general agreement that the resource should be thought-provoking and encouraging. A clear divide between the two groups of students was seen with respect to question 3, with third year students having a much better idea of the three dimensions of sustainable design than final year students.

Student feedback on the two websites was very different. The InformationInspiration website was considered to be "a very good foundation to improve sustainable design knowledge" (final year student), the examples, description of tools and fact based information being highlighted as useful. However, much concern was raised regarding the likelihood of designers actually using a number of the tools, although there was general agreement that they would try to use them in their future design work. The Sustainable Design Portal did not gain favourable feedback due to the fact it is essentially a database of links to other resources. It requires more knowledge of the subject area than undergraduates generally have in order to use it effectively, and the Portal is also less structured. With

respect to the design of the website, comments indicated the need for more downloads and case studies and for it to be less text based and more inspirational.

This study has shown that existing resources do not address the socio-centric aspects of sustainable design, albeit the InformationInspiration resource has a section entitled 'New ways of doing things' which begins to consider the socio-centric aspect. Most resources, although generally clear and easy to navigate, encompass many of the tools and ideas related to eco-design but not sustainable design as defined in section 2 of this paper. Thus, the web-based resource developed as an output of this study complements existing resources and contributes to education in this field.

This project determined the components of a learning and teaching resource for the teaching of sustainable design. It recommends that true sustainable design requires the final design to be left as late as possible as, first and foremost, sustainable design requires consideration of the design's purpose and its effects on the user, the community and society as a whole. The resource therefore will need to engage the user to think holistically about not so much the design of the product/item but more about the best solution to the identified design problem.

#### 4.1.2. Web resource design

The results of the research suggested that in order to engage the target audience it is necessary to offer a high level of interactivity in the web-interface. The following requirements were considered essential organisational elements for the creation of the web-resource: easily accessible; intuitive; inspiring; engaging; guiding; open-minded; visual; up to date; allow for real discussions; involve real people and be more than a text book.

Based on the analysis of literature, the content of the web resource is arranged into five main navigation sections with specified sub-sections (Conrad and Humphries-Smith, 2009):

- past and future
- time
- people issues
- consumption
- design

Figure 1 is a screen shot of the home page of the new web resource, known as "Socio-Centric Sustainable Design – a resource for designers and engineers", which shows the diagram introducing the three dimensions and demonstrates the intuitive navigation of the sub-sections on the right hand side. The navigation tabs at the top cover latest information on legislation, conferences, exhibitions and publications.



Figure 1. Homepage from [www.sociocentricdesign.com](http://www.sociocentricdesign.com)

There is also a [podcast](#) which provides a brief history of sustainable design to help the user understand how the three dimensions have come about.

The [theories](#) section of the website can be seen here, usefully linking to external podcasts to enable the views of significant individuals in this field to be heard. This is important to ensure engagement as respondents to the survey indicated that engagement is achieved by using: important groups and individuals; blogs; wikispace; podcasts; talks, conferences and exhibitions; publications; downloads and webinars. The website therefore features a blog facility which will automatically collate data into a wiki. It is anticipated that this feature will be a strength of the site, keeping it up to date with the latest thinking.

## 4.2. Stage 2

### 4.2.1. Evaluation by students

The feedback from students was generally positive, particularly with respect to navigation, layout and the concise nature of the content. The theories section and links to external information was also given positive feedback, with the comment that “it makes the resource more topical and varied. It means I am more likely to return and check for new articles/links”.

There were a number of criticisms, in particular of the layout of the publications page, and there were several requests for more real life examples of products and also companies that engage with truly sustainable design. A more detailed comment was that:

*“Although the conciseness of the information is great, the site still needs to have a lot more graphical information and content such as diagrams, charts, images, graphics, animation, video, etc. to really make the site engaging. Simple activities and exercises can also be incorporated to make the site more interactive.”*

### 4.2.2. Final web resource design

The modified publications page in response to student feedback can be seen at [http://www.sociocentricdesign.com/index.php?option=com\\_content&view=article&id=1&Itemid=9](http://www.sociocentricdesign.com/index.php?option=com_content&view=article&id=1&Itemid=9). Instead of a long list of publications, it is now divided into sections. Currently those sections are: *history of sustainable design, theories, methods/techniques and latest publications*. A couple of links to case studies have been added (Aeron chair by Herman Millar and the Kodak Disposable Camera). These will be added to as further case studies are developed.

## 5. Conclusions

This new web based resource focuses on the poorly understood, and often ignored, socio-centric dimension and does not try to replicate information that is already available. Whilst the new resource does link to existing resources, it concentrates on providing material unavailable elsewhere and presents it in an inspirational and engaging format for aspiring designers and engineers.

This resource is unique in focusing on the socio-centric aspect of sustainable design and in pulling together the disparate elements of this aspect into one resource. It provides the opportunity for aspiring designers and engineers to engage with and learn about this vital aspect of sustainable design - an aspect, without consideration of which, it is impossible to design truly sustainable products.

The web based resource which has been developed as an outcome of this research currently provides a ‘bite-sized’ introduction to the socio-centric dimension. To ensure it has continuing value, it will need to be updated and added to - both by the author and (through the wiki facility) by users of the site. It would also be possible to add value to this resource by responding to the last of the criticisms from the students and adding activities and exercises. The website is publicly available and, through dissemination (such as producing an article for the Engineering Designer journal of the Institution of Engineering Designers and offering a workshop at a design/engineering education conference such as the annual Engineering & Product Design Education conference), a wider audience of undergraduate designers and engineers will be able to make use of it. Although primarily set up with product and engineering designers in mind, the site would be applicable to a wider audience, particularly if the examples were to be adapted.

## 6. Reflections

Reflecting on the experience of undertaking this project, two main points arise. Firstly, the satisfaction of pulling together a currently disparate knowledge base into one source and secondly, the difficulty of overcoming the technical barriers to setting up and operating a website within a security-conscious institution. Although the main aim of producing an introduction to the socio-centric dimension has been achieved, the resource has greater potential than was considered at the inception of the project. The aspiration is for the website to become a continually growing resource and, indeed, hub for the development of this area of sustainable design. Currently the site is hosted by a commercial web server as the difficulties of setting up a flexible website under the author's control within the host academic institution proved too much to overcome. There is no obvious solution to this problem, although the site will need to transfer to an alternate host in the near future. Also, there will need to be flexibility with multiple author control in order to realise the full potential of this resource.

## Acknowledgements

The author gratefully acknowledges the participation of students on BA/BSc Product Design, BSc Design Engineering and BSc Computer Aided Product Design courses at Bournemouth University.

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