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THE DEVELOPMENT OF AN ON-LINE LEARNING AND TEACHING RESOURCE FOR THE SOCIO-CENTRIC ASPECTS OF SUSTAINABLE DESIGN

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ABSTRACT
This paper fits into the topics of socially relevant design, design and emotion and sustainable design and explores the question how can we create a more sustainable way of life? The paper also addresses the central theme of the conference – Design Education – creating a better world.
This paper reports on the next phase in the development of a web-based learning and teaching resource specifically aimed at the socio-centric dimension of sustainable design which can be found at www.sociocenticdesign.com . A more extensive literature review was conducted, of which a summary is presented, however, the focus is on the outcomes learned from the collection of further primary data. It is confirmed that there is strong dominance by the techno and eco-centric dimensions and that there is a lack of awareness of the socio-centric dimension.
It is concluded that being sustainable in design actually is about leaving the final design to later; it means that first and foremost sustainable design is to consider the designs purpose and its effects on the user, the community and society as a whole.
An evaluation of two existing web-based resources, that focus on eco-design, was also conducted and informed the outcomes presented in this paper. The paper sets outs in some detail the content, arrangement and suggested web-interfaces for the new learning resource focused on the socio-centric dimension. The content is arranged into the following sections based upon the recommendations generated by Conrad: Past and Future; Time; People; Consumption, Design and Theories. The results of the research suggest that a high level of interactivity in the web-interface will be required.

Keywords: Sustainable design; on-line learning; sustainability; product design; design education; socio-centric

1 INTRODUCTION

This paper reports on the next phase in the development of a socio-centric learning & teaching resource and follows on from the paper *An evaluation of existing online learning and teaching resources for the socio-centric aspects of sustainable design* [1] presented at EPDE08.
This paper presents a review of additional literature but focuses on the outcomes of further primary data that was collected. A detailed evaluation of two existing web-based resources, that focus on eco-design, is also presented. The paper sets outs in some detail the content, arrangement and suggested web-interfaces for a new learning resource that is being developed as part of a Higher Education Academy (HEA) Engineering Subject Centre, funded Mini-Project.

2 LITERATURE REVIEW

2.1 Sustainability

Sustainability and sustainable development have a long history dating back to at least 1972 and the United Nations Environment Program (UNEP) Stockholm conference. The Brundtland Report of 1987 [2], the Rio Earth Summit of 1992 [3] and the Kyoto Protocol of 1997 [4] which came into force in February 2007 moved the agenda forward. Thus, there are binding targets to reduce greenhouse emissions between 2008 and 2012. As indicated in the Brundtland report true sustainability is based on

three dimensions, the eco, techno and socio-centric dimensions [5]. The most common approach adopted by industry to eco-design, as opposed to sustainable design, is eco-efficiency – a linear cradle to grave approach [6]. However, there is opposition to eco-efficiency as a strategy as it only makes people 'less bad' [7]. It is also worth noting that sustainable design is "not only the design of sustainable products, but it is also the study of needs and ethics, of current and future technologies, of sociologies, consumer behaviours and environmental impacts and improvements" [8]. Timothy O-Riordan classified the techno and eco-centric approaches [9], the socio-centric approach, that covers all the social and ethical issues, was then added to create the Triple Bottom Line [10] or three dimensions that moves eco-design to sustainable design.

2.2 Sustainable Design Approaches

There are a range of approaches that have been developed, usually by people passionate about sustainable design and in particular, the socio-centric aspect, these include:
Cradle to Cradle – McDonough and Braungart [11]
Biomimicry – Benyus [12]
Emotionally Durable Design – Chapman [13]
Product Attachment – Mugge [14], Schifferstein [15]
Behavioural Design – Lilly & Lofthouse [16]
Slow Consumption – Cooper [17]
Overall the socio-centric dimension requires an interdisciplinary approach, whereby designers 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.

2.3 Designers, Engineers & Sustainability

Sustainability has been described as the next revolution after the Industrial Revolution of the 1880s and the Agricultural Revolution of 10,000 yrs ago [18]. In 2005 HEFCE [19] required sustainable development to be embedded in all HE curricula and the Engineering Council UK [20] required engineers to "undertake engineering activities in a way that contributes to sustainable development." Thus, obligating those educating engineers and designers to include sustainable design in the curriculum in some way. The difficulties of doing this should not be underestimated and are reported upon elsewhere by Humphries-Smith [21] and Ramirez [22][23]. A raft of legislation has seen practicing designers and engineers also grappling with sustainable design issues and there are a number of web-based resources explaining the principles and tools of sustainability. These range from the government backed www.envirowise.gov.uk through resources such as the InformationInspiration website and Sustainable Design Portal which are evaluated in this study to the multinational backed O2 Global Network www.o2.org/index.php .
It is concluded that being sustainable in design actually is about leaving the final design to later; it means that first and foremost sustainable design is to consider the designs purpose and its effects on the user, the community and society as a whole. Therefore, a resource to teach this has to contain more than simple checklists and spreadsheets to apply during the design process.

2.4 Objectives

Thus, the objectives of the study were determined to be to:

- Demonstrate that there is a dominance of eco-centric and techno-centric dimensions in terms of current sustainable design education;
- Define the socio-centric dimensions in detail;
- Evaluate the existing teaching tools with a focus on web-based tools;
- Make conclusive suggestions for a web-based teaching tool that is focused towards the socio-centric dimension of sustainability.

The study is important as existing resources do not focus on addressing the socio-centric aspects of sustainable design. For example, the InformationInspiration resource is generally a clear, easy to navigate resource which encompasses much of the tools and ideas related to eco-design but only 'New ways of doing things' section considers the socio-centric aspect in any way. Thus, the output of this study will complement existing resources and contribute significantly to education in this field.

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. A survey method of data collection was chosen to be used with the respondents due to the fact that the data had to be collected over a short period of time and the completion could be organized 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 courses at Bournemouth University. The rationale for this was that the web-based resource was to be designed to be used 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 3 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 and 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 Information-Inspiration 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 Information Inspiration website? Please consider content as well as website design.

In addition to the evaluation by students, the researcher, undertook an evaluation of both websites from a knowledgebase of being a graduate of BA (Hons) Product Design at BU, having successfully commercialized her final year project, the 'Pop-Up Tent'[1] and undertaking the MSc Sustainable Product Design course also at BU.

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, the questionnaire must stand alone along with an assumed level of computer literacy required to answer an on-line survey. As with all questionnaires the time required by participants was a potential barrier at 30-45mins to compare the two websites.

4 RESULTS

The initial questionnaire of three questions was completed by 40 third year students who received a short introductory lecture by the researcher and had 10mins to complete the questionnaire at the end of the lecture. The same questionnaire was handed out to over 50 final year students, at their end of year Design Show, with the researcher being present all day to answer questions and the questionnaires being collected at the end of the day.

A total of 163 students were contacted personally by the researcher regarding the second 5 questions requiring evaluation of the two websites.

4.1 Questionnaires to Students

The initial three questions produced 40 responses from third year students and 15 responses from final year students for anlysis. Generally third year students demonstrated a much better level of understanding, for example, responses to question 1 included the concepts of 'taking the future into account and 'adopting a holistic view' and 'making little impact upon the environment'. However, the vocabulary in general would indicate a superficial level of knowledge which relies upon repetition of 'buzzwords' but not indicating a deeper understanding of sustainable design.

[1] Full information can be found at http://www.franziskaconrad.co.uk/qp-temp.htm

Question 2 elicited a mixed set of responses but some of the more valid suggestions came with a passionate demand such as from a third year student :

> Something which moves away from the current leaflet form of information and educates on the entire design and production process, not just focusing on the obvious problems/solutions – we've heard all about recyling!! People need to know about the impact of the entire process of bringing a new product to market …(3rd year)

Most of the responses indicated they were looking for eco-design orientated content such as suppliers, material and manufacturing information and current/future technologies. In terms of interactivity there was general agreement that the resource should be thought-provoking and encouraging:

> Something interactive [that can provoke thoughts of]: consequence, options, our duty as designers. Something simple and encouraging. (3rd year)

And

> I think the main issue is ease of use, it should be easy to use. One that doesn't baffle you with unnecessary technical language, or at least explains… (final year)

With respect to question 3, analysis indicated a clear divide between the two groups of students with third year students having a much better idea of what the three dimensions of sustainable design were about than final year students, of whom, two thirds could not answer the question. Most mentioning that it has not been part of their sustainability curriculum. Some of the responses from third year students do show some concept of the socio-centric dimension:

> A products impact on society and culture AND Encouraging sustainable societies AND People, health, wellbeing, humanity (all 3rd year)

And

> I believe that socio-centric is the most important…I believe it is human expectation and aspiration that drives sustainability and without this the future would look bleak for people now, and in the future (final year)

Only 8 evaluations by students of existing web based resources were received despite numerous attempts by the researcher making personal contact with the potential respondents. The InformationInspiration website was considered to be "a very good foundation to improve sustainable design knowledge" (final year) with the examples, tools and fact based information being highlighted as useful. Scepticism was expressed regarding a number of the tools and the likelihood of designers actually using them. There was, however, general agreement that having been introduced to some sustainable design tools they would try to use them in their future design work. There were also calls for more downloads, case studies and for it to be less text based and more inspirational. The Sustainable Design Portal did not have such a great appeal possibly because it requires more knowledge and is less structured.

4.2 Content of web resource

Drawing upon the feedback received from students and from the analysis of existing web based resources by the researcher it is proposed that the home page of this new web resource, known as "Socio-Centric Sustainable Design – a resource for designers & engineers" will feature a diagram of the three dimensions with 'pop-out' explanations of each dimension by way of introduction to the full breadth covered by sustainable design as opposed to green design or eco-design.

It is proposed that the content of the web resource will be arranged into the following navigation sections with sub-sections:

- Past and Future – addressing the question - is sustainability the end of design?
- Time – emphasizing how time is vital for good solutions, how it needs to be spent upon evaluation and interaction with the future user and community it will impact upon;
- People Issues - Society – How designers can be an active part of it; The Developing world – How our designs affect the developing world; The Western World – How our designs affect the developed world; Wellbeing – Design based on people.
- Consumption - Consumption is natural; Filling gaps – too much free time; Slow consumption; Living with less
- Design - Design for human needs; Design for Community needs; Service design; Inclusive design; The consequence of choice – visualising design choices and the resulting impact on the individual, the local community, the society in general and the natural environment

- Theories – covering the following theories: Dematerialisation; Products to Services ; Product Longevity; Cradle to Cradle; Biomimicry; Emotional Durable Design; Behavioural Design – each of these will be briefly explained, in some cases with podcast interviews with the originators, and linked to original web-based sources.

4.3 Interface Requirements

The results of the research suggest that in order to engage the target audience it will be necessary to offer a high level of interactivity in the web-interface. The requirements listed below are considered essential organizational 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.

* Engagement is achieved by using: Important groups and individuals; Blogs; Wikispace; Podcasts; Talks, Conferences and Exhibitions; Publications; Downloads and Webinars.

5 CONCLUSIONS

The intention of this new web-based resource is to focus on the socio-centric dimension and, therefore, not to replicate information that is already available. Thus, the intention is to link the new resource to existing resources such as the InformationInspiration website and concentrate on providing material unavailable elsewhere and presented in an inspirational and engaging format for aspiring designers and engineers.

Figure1. shows an example section which shows the intuitive navigation, and use of podcasts produced by important individuals in this field. The navigation tabs at the top also cover latest information on conferences, exhibitions and publications and also a blog facility which will automatically collate data into a wiki.

Figure 1. Example of page from www.sociocentridesign.com

This resource will be 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 will provide the opportunity for aspiring designers and engineers to engage and learn about with this vital aspect of sustainable design. An aspect, without consideration of which, it is impossible to design truly sustainable products.

By the time this paper is presented in September 2009 the web-based resource should be ready to go live. The web-based resource should also have been evaluated, in part complete form, by final year students who were involved as third year students in this study, as well as by second year design students.

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