

INTERNATIONAL CONFERENCE ON **ENGINEERING AND PRODUCT DESIGN EDUCATION**
13-14 SEPTEMBER 2007, NORTHUMBRIA UNIVERSITY, NEWCASTLE UPON TYNE, UNITED KINGDOM

TO EMBED OR NOT TO EMBED (SUSTAINABILITY IN THE CURRICULUM) THAT IS THE QUESTION – AND DO WE HAVE A CHOICE?

Dr Tania HUMPHRIES-SMITH

School of Design, Engineering & Computing, Bournemouth University

ABSTRACT

This paper fits into the stream of design curriculum development and explores a number of the questions related to shaping the future of design education and designers. The question this research seeks to address is whether sustainability should or can be an integral part of engineering/product design programmes or whether it should/or can be developed as a separate design discipline? The research also briefly addresses the difference between, eco-design and sustainable design.

Keywords: sustainability, eco-design, environmental design, curriculum, design education, design process

1 INTRODUCTION

1.1 Context

We are currently operating within the ‘Decade of Education for Sustainable Development’ as defined by UNESCO as being 2005-2015. HM Government of UK has determined a sustainable development strategy that states ‘Our strategy for sustainable development aims to enable people throughout the world to satisfy their needs without compromising the quality of life for future generations.’ [2]. This in turn has driven an action plan for education and skills in the UK which states ‘We need to look at sustainable development as a whole – how to use our resources without wasting them; how to teach and learn about sustainable development; how to generate the skills, knowledge and understanding to allow us to fulfil our duty as global citizens.’[3]. In line with this, Higher Education Funding Council for England (HEFCE) via the consultation paper ‘Sustainable development in higher education’ [4] have clearly indicated that a sustainable approach should be adopted throughout higher education in the UK, however, sustainability has particular and more far reaching implications in the design/engineering context.

1.2 Literature Review

Before discussing the literature it is important to clarify the meanings of various terms, namely, eco-design and sustainable design. Edwards [1] clearly defines eco-design and ‘reducing the environmental impacts of products throughout their life cycle’, whereas sustainable design ‘addresses the social aspects of production’. This is seen to include

the humanization of design which includes consideration of factors such as the conditions under which the products are manufactured. Thus, necessitating consideration of business values, social responsibility and ethics within product design. As Edwards notes, the tools for evaluating the social performance, such as the Global Reporting Index (GRI) and SA8000, deal with company performance not product design and development.

Larssaether [5] presents the idea of ‘products as carriers of morality’ in the context of Corporate Social Responsibility (CSR). He suggests that the current CSR agenda has not changed practice and that it needs to be broadened to include moral product/service systems. The Royal Academy of Engineering published 12 Guiding Principles [6] are based around the three dimensions of sustainability, eco centric, techno centric and socio centric which also includes the social/moral aspects of products.

Much of the literature on sustainable design focuses very clearly on eco-design by the definition discussed above. The idea of eco-design has been around for at least a decade, for example the ECODESIGN Information Platform [7] has been in operation since 1996. However, that accepted clearly the integration of eco-design issues and associated techniques (as for example specified in ISO14062 [8]) has implications for the whole design and development process. Verhulst and Baelus [9], McInenig [10], Charon [11] among others, discuss various aspects of how eco-design affects the design and development process. Verhulst and Baelus discuss an approach to incorporating eco-design methodology into the existing new product development process. They base their integrated method on the 1997 Eco-design Manual [12] which they claim is still one of the most complete eco-design manuals, which presents a roadmap of eco-design. They comments that the most significant changes to the development process due to eco-design occur in the early stages. Charon reports on a case study at Herman Miller Inc of a new product development using a new protocol that required placing a high value on responsibility to the environment. It is reported that the additional constraints demand ‘creative alternatives to conventional design solutions.’ However, the protocol focuses on an environmental rating tool for products, use of environmentally friendly materials and disassembly guidelines which are essentially elements of eco-design. McInenig presents a revise PDS, he calls an SPDS (Sustainable Product Design Specification) as a tool to help University students develop sustainable products.

1.3 Problem Statement

In the context of these discussions the research then focused on what then is to be made of programmes with titles such as BSc Sustainable Product Design, BSc Sustainable Design, BEng Sustainable Engineering, BA Product Design: Sustainable Design and BA Product Design Sustainable Futures – all currently on offer on the University Central Admissions Service (UCAS) website. The existence of these programmes within design education raises a number of questions. How for example, does BSc Sustainable Product Design differ from BSc Product Design? What message is being sent? Does the BSc Product Design programme not consider sustainability? Should we be educating all designers to deal with sustainability issues or would it be better to educate specialists in sustainable design? And most importantly do we all know what we mean by sustainable design? Indeed do we all mean the same thing by sustainable design.

2 METHODOLOGY

The research began with a literature search to establish the current state of thinking, followed by questionnaires used to seek the views of academics in design departments of UK HEIs; students on existing engineering/product design programmes and employers of graduates from these programmes.

The following questions were used in the questionnaires to academics:

1. To what extent are your design/engineering students aware of sustainable design issues?
2. To what extent do your design/engineering students apply sustainable design tools/techniques?
3. To what extent do you think all designers/engineers should be aware of sustainable issues?
4. To what extent do you think all designers/engineers should be able to apply sustainable design techniques?
5. Would you consider providing a course that produces a graduate who is a specialist sustainable designer? Please give reasons for your answer.
6. What do you consider sustainable design to be?

Questions 5 & 6 were free answers, whereas questions 1-4 required a choice of not at all; a little; working knowledge or high level. The exact wording of the questions were modified to make them appropriate to academic, employer or students, for example, question 1. became: ‘To what extent are your designers/engineers aware of sustainable design issues?’ for employers and ‘To what extent are you aware of sustainable design issues?’ for students.

3 RESULTS

3.1 Views of Academics

13 replies were received, all from institutions with IED accredited programmes.

Table 1 Results of Questionnaire - Academics

Question	Not at all	A little	Working knowledge	High level
Qu 1			8	5
Qu 2		3		1
Qu 3			10	3
Qu 4			7	6

Question 5. - Five responses were outright ‘no’, four of these due to lack of market (one of these had had a programme in the past and that programme had now closed) and one response was that it should be embedded in Product Design or Design Engineering programmes. Two responses were yes in the future when there is likely to be demand. Six responses were ‘yes’, one only at masters level, another indicated that many students go on to study this subject area at masters level, the three remaining all identified a likely future demand due to changes in legislation.

Question 6. - The responses to this question, while demonstrating a range of depth, tended to have a common theme is perhaps most concisely captured by the following two definitions: “The strategic use of design to meet consumer need without compromising the environment” and “Satisfying consumer needs whilst minimising the environmental impact”. More limited views spoke of use of renewable resources, use of life cycle analysis and focus on manufacture, use and disposal.

3.2 Views of current Students

Responses were received from students on BA Interior Design (ID) (level C & I); BA/BSc Product Design (PD) (levels C & H) – a total of 44 PD and 45 ID.

Table 2 Results of Questionnaire - Students

Question	Not at all	A little	Working knowledge	High level
Qu 1	2 PD, 1 ID	23 PD, 29 ID	15 PD, 15 ID	3 PD, 2 ID
Qu 2	3 PD, 7 ID	33 PD, 34 ID	7 PD, 6 ID	
Qu 3		1 ID	15 PD, 22ID	29 PD, 24 ID
Qu 4	1 ID	2 PD, 2 ID	19 PD, 25 ID	22 PD, 19 ID

Question 5. – Views were very split in response to this question, approximately half said ‘no’ in many cases because it was a ‘boring subject’. The other half were positive but ranged from ‘only as part of design course’ to ‘yes, complete course’. While many mentioned the importance of sustainable design in the future, a few mentioned that they had studied sustainability at school and that was sufficient.

Question 6. – generally the responses were either of a shallow or a very broad nature ‘design that considers the environment’ and ‘design that uses sustainable materials’ were common themes. A few level H responses from Product Design students were more considered such as ‘Design for the now without impacting on the future: a true sustainable design will be holistic and have completely closed loops in terms of materials and energy.’

3.3 Views of Employers

19 replies were received, all from employers of either placement or graduate students from the Design programmes of the School of Design, Engineering and Computing, Bournemouth University.

Table 3 Results of Questionnaire - Employers

Question	Not at all	A little	Working knowledge	High level
Qu 1	1	12	5	1
Qu 2	3	11	5	
Qu 3			8	11
Qu 4			8	11

Question 5. – 5 replied ‘yes’ but that they would have to be an all round designer as well. 6 replied ‘no’ largely due to being too small to employ a specialist. 8 replied ‘yes’ they felt it would be essential in the future, with one feeling it might give them ‘a competitive edge’.

Question 6. – most responses spoke about materials being either recyclable or renewable with some referring to the carbon footprint of materials. More rounded responses are typified by the following example: ‘minimize impact on environment through long life cycles, parts re-placeability, classic aesthetics and re-cyclability’. Indeed, the concept of timeless or classic design with respect to aesthetics was mentioned by several respondents. The most wide ranging response defined sustainable design as ‘the designing of physical objects to comply with principles of

economic/social sustainability'. Only two responses mentioned the fulfilment of legislative requirements.

3.4 Comparison of Views

None of the respondents used the term eco-design, although many referred directly and indirectly to environmental design or design for the environment. All respondents had some common concept of what sustainable design is, however, the definition varied in depth and breadth considerably. Generally, the academics had the most refined definitions, albeit, by the definition of Edwards, most of the respondents are referring to eco-design and not sustainable design. Thus, a very commonly held view among students and employers alike is that sustainable design should/can be an integral part of an education of a designer. All groups of respondents surveyed tended to see sustainable design as an issue for the future and not for now. Interestingly, several employers mention aesthetics as being important in the context of sustainable design, a concept which clearly links with the socio-centric dimension of sustainability but which was not mentioned by any academics or students.

4 CONCLUSIONS & RECOMMENDATIONS

There is a general good level of awareness of eco-design issues and to some extent the tools and techniques associated with them, such as life cycle analysis. However, the wider issues covered by sustainable design are much less widely perceived and even less understood. Thus, the commonly held view that it should and can be part of a designers/engineers function/education. It would appear that programmes with titles such as BSc Sustainable Product Design have, at best, incorporated eco-design principles into the design and development process in the way that McInerney and Verhulst and Baelus report. Although it would appear that in some cases this simply takes the form of one or two units related to eco-design.

However, if true sustainable design, as defined by Edwards, is to be considered rather than eco-design, it is rather more difficult to perceive how this could easily be incorporated into the existing education or functions of product designers or design engineers without detrimentally effecting other knowledge and skill areas. Therefore, it is suggested that there is a potential opportunity for the introduction to education and industry of specialist sustainable designers.

As might be anticipated this paper has raised more questions than answers. Thus, the following areas are recommended for further investigation:

- A synthesis of the literature from business, economics, law and design/engineering sectors to determine a true state of the art with respect to sustainable design.
- In the light of the item above, (re)define the term sustainable design and gain acceptance by the product design sector as a whole.
- Determine a skills set for a specialist sustainable designer.

5 ACKNOWLEDGEMENTS

The author gratefully acknowledge the participation of employers of placement students and graduates from Design programmes in the School of DEC, Bournemouth University (BU), students on Product Design and Interior Design programmes, also at BU and academics from IED accredited course in this research.

REFERENCES

- [1] Edwards, S. Linking Sustainable Product Design with Corporate Social Responsibility: a Consideration of Frameworks and Measurement Tools, *Proceedings of Towards Sustainable Product Design 10*, Farnham, UK, 2005.
- [2] HM Government, 2005. Securing the future: delivering UK sustainable development strategy, Executive Summary
- [3] Clark, C. Rt Hon, MP *Sustainable development action plan for Education and Skills*, 2005.
- [4] HEFCE (2005) *Sustainable development in higher education – consultation on a support strategy and action plan*. Higher Education Funding Council for England, UK.
- [5] Larssaether, S. Moral products – the missing dimension of CSR? *Proceedings of Towards Sustainable Product Design 10*, Farnham, UK.
- [6] Royal Academy of Engineering. *Engineering for Sustainable Development: Guiding Principles*, London, UK, 2005
- [7] ECODESIGN Team, *ECODESIGN Information Platform*, Institute for Engineering Design, Vienna University of Technology, 1996
- [8] British Standards. *ISO/TR 14062:2002 Environmental management-Integrating environmental aspects into product design and development*, British Standards Institute, UK, 2002.
- [9] Verhulst, E. & Baelus, C. Implementation of an eco-efficiency approach into the methodology roadmap for integrated product development, *Proceedings of 5th Engineering & Product Design Education International Conference*, Salzburg, 2006.
- [10] Mclening. C. Developing a new sustainable Product Design (SPDS) Specification Tool, *Proceedings of Towards Sustainable Product Design 10*, Farnham, UK, 2005.
- [11] Charon, S. Product Development Processes: A Case Study in Sustainable Product Design, *Proceedings of Towards Sustainable Product Design 10*, Farnham, UK, 2005
- [12] Brezet, H., Van Hemel, C. *Ecodesign: a promising approach to sustainable production and consumption*. United Nations Publication, UNEP, 1997.

Corresponding Author Contact Information

Dr HUMPHRIES-SMITH, Tania
Bournemouth University
School of Design, Engineering &
Computing
Poole House, Talbot Campus
Fern Barrow
Poole, Dorset
BH12 5BB
thumphri@bournemouth.ac.uk
01202 965626