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Exploring design and innovation: further developments in the innovation curriculum

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Abstract

The Exploring Design and Innovation booklet was developed as a curriculum resource to disseminate information about Millennium Products and the Design Council’s Sharing Innovation web site. The Sharing Innovation project examined over 80% of the 1,000 plus Millennium Products, looking at their inspiration, implementation and impact. This makes the associated web site a valuable resource of product case studies.

The paper discusses the development of the booklet and its subsequent dissemination to tertiary education lecturers and the results of a follow-up questionnaire. It goes on to examine research work that has been conducted since publication. This includes investigating more areas of the design process and drivers of innovation.

Part of the research will also be looking at ways of extending the curriculum developments in the teaching of contextual design within tertiary education. Other areas include the methods used to disseminate this information, be it through further publications or by use of the Internet. The paper reports on these developments and the progress in establishing greater cross-institutional and cross-subject collaboration within this research.

Keywords: higher education, innovation, product design, Millennium Products, curriculum

Introduction

Exploring Innovation and Design is the title of a booklet published last year by the Department of Design at Brunel University in conjunction with the Design Council (Tabor et al, 2000). The aim of the booklet is to disseminate information about the Design Council’s Sharing Innovation (Design Council, 2001) web site to lecturers in tertiary education and illustrate ways to incorporate data on the site into their design curriculum.

This paper looks at the content of the booklet and its uses by tertiary education lecturers. It then goes on to examine further work that has been continuing since publication and the direction that this research is taking.

Sharing Innovation

Sharing Innovation is an on going project run by the Design Council to disseminate good practice in the area of new product development to business and educational sectors. It was launched in 1999 and followed on from the Millennium Products programme that the Design Council was also running. The project results are disseminated on their Sharing Innovation web site (Design Council, 2001). A large part of this site includes case studies, which examine the stories behind the Millennium Products looking at their inspiration, implementation and impact. The Millennium Products themselves were chosen because they demonstrated innovation in their use of technology, their market placement or the services they provided (Design Council, 1998).

The Millennium Products programme is now complete with over 1,000 products selected. To keep the Sharing Innovation site up to date, the Design Council is continuing its search for innovative products. Their stories will be added to the web site in due course.

As well as providing first hand information about how these products were developed, the
site provides additional statistical information by collating responses to a number of questions in each of the sections. This includes questions such as ‘where did the original idea come from?’ or ‘how was the product development funded?’

**Developing Exploring Innovation and Design**

Development of the booklet involved two main areas of research, firstly, studying the literature on innovation and new product development; secondly, by examining the Millennium Products and their sharing innovation stories as the Design Council released them. The products were important because they were central to the Sharing Innovation web site and would provide leads as to the directions the booklet would take.

The research resulted in some different models of presenting the findings. This included looking at development in technology, society and markets as separate issues. The final version of the booklet has three main sections:

- the evolving design process
- designing the future
- learning from the past.

This division of the various topics enabled the discussion of issues relating to the design process separately from the type of products involved. The segmentation between technology, society and markets was discussed in the section on designing the future.

**The evolving design process**

This section looks at some of the influences on designers and the way they design products. Twelve topics are examined and these are listed in Table 1. For each topic there is a brief text, of around 200 words, which gives an outline of the key issues in that area linking where possible with particular Millennium Products. A project trigger follows the text, which could be used as it stands or adapted to provide a task for students to undertake. Sometimes this involves searching the Sharing Innovation web site to find case studies that relate to the topic. With some topics, these case studies are listed using the keywords necessary to locate them on the web site. The final part for each topic is further reading, which lists texts that will provide additional information in that area.

<table>
<thead>
<tr>
<th>The evolving design process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design for sustainability is a reality.</td>
</tr>
<tr>
<td>Measuring a product’s aesthetic value.</td>
</tr>
<tr>
<td>Design for human use.</td>
</tr>
<tr>
<td>Design for manufacture.</td>
</tr>
<tr>
<td>Market research as a design tool.</td>
</tr>
<tr>
<td>Idea generation.</td>
</tr>
<tr>
<td>What does it take to be a successful innovator?</td>
</tr>
<tr>
<td>Team dynamics.</td>
</tr>
<tr>
<td>Financing the innovation process.</td>
</tr>
<tr>
<td>Technology push or market pull innovation?</td>
</tr>
<tr>
<td>Quantifying the risk of innovation.</td>
</tr>
<tr>
<td>Incremental innovation or radical innovation?</td>
</tr>
</tbody>
</table>

Table 1: Contents of The Evolving Design Process.

The 12 topics covered are not exhaustive but have been chosen to reflect some key areas affecting the design process, whether the designer is a student, educationalist or a practitioner. The choice was also in part affected by the Millennium Products that were detailed on the Sharing Innovation web site and which could provide relevant support material.

**Designing the future**

This section looks at some of the areas that are pushing forward today’s products and new product development. The 12 topics in this section are listed in Table 2. Reviewing some of the literature in this area (Thackara, 1997; Holden, 1996; Robert, 1995; Henry and Walker, 1991) three broad and, at times, overlapping sub-categories could be distinguished as providing the innovation drivers. These were technological developments, social and cultural developments and market changes. The topics are loosely grouped in these areas in this section, but strong emphasis of the division is not made, so as not to be too prescriptive.

**Learning from the past**

Though it is important to be up to date in the latest developments when developing new products, much can also be learned by examining how past products have changed over the years. This section provides a brief overview of some of the key events and technological developments along with major design movements over the last century, in the form of a time chart. It can be surprising at times to learn when some products were first developed, but then may take many years before they achieve any real market penetration.
Designing the future

Micro and nano technology.
The digital revolution, software, dematerialisation and product convergence.
Smart materials and intelligent fabrics.
Internet and online communications.
Biotechnology.
The 24-hour society.
Demographic change.
Design for disability.
Globalisation and cultural diversity.
Product differentiation and customisation.
Safety and usability.
Care for the environment.

Table 2: Contents of Designing the Future.

For example, the first steam iron was introduced in 1926 (Hillman, 1998). The introduction of new materials such as many of the thermoplastics or stainless steel also influenced the nature and style of many products.

In addition to the time chart, there are three short essays looking at different product areas, which show how these types of issues can be examined, as part of student coursework.

Supporting web site

As well as being published in a booklet, a web site was also launched which contains all the text (Brunel University, 2001). It also provides direct links to the Millennium Products case studies on the Sharing Innovation web site that are mentioned in the booklet. This was considered an important feature to aid its use by students. There are over 800 products on the Sharing Innovation web site, which can make it difficult to locate particular products. These direct links speed up the process of locating the case studies. The web site will also be expanded and this is discussed in Section 5.

Booklet distribution and follow up

With funding from the Design Council, nearly 400 copies of the booklet were sent to course directors of product design, design engineering and design management courses at UK tertiary education establishments. A further 800 booklets were sent to course directors in related areas such as mechanical and manufacturing engineering, engineering management and business studies courses which often contain modules on new product development. Three months after the booklets were sent out, a follow up questionnaire was also sent to the course directors. Of these, a rather disappointing 35 were returned completed. However, there was an equivalent number of enquiries for booklets from people who received the questionnaire but did not originally receive a copy of the booklet.

The reasons for the low return were probably two-fold. Firstly, as the booklets were not sent out to named individuals, course directors may have passed on the booklets but did not necessarily pass on the questionnaires. Secondly, pressure of time along with the gap between mailings meant that people just could not be bothered to reply. This is in contrast to follow up work carried out with secondary school teachers who also received the booklet (Tabor and Chappell, 2001).

Questionnaire results

Despite the low return of the questionnaires they still show some interesting results. When developing the booklet, it was decided not to be prescriptive on how to teach the material, as all lectures develop their own material. Rather, the material could be easily adaptable to all levels. The questionnaire asked at which levels the material in the booklet was being used. Table 3 shows the percentage of use across the level is fairly even at undergraduate level. This was different from our initial expectation that it might be more

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>HNC/D</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>MEng</th>
<th>MA/MSc</th>
</tr>
</thead>
<tbody>
<tr>
<td>At which level are you using the booklet</td>
<td>20</td>
<td>22</td>
<td>22</td>
<td>25</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3: The percentage of respondents, answering the question on which level that the booklet was used?
that the booklet was being well received. The content was also being used in the Department of Design at Brunel University. Therefore, a second phase of development was started at the beginning of this year.

The first part of this continued the investigation of the various topics within the first two sections of the booklet, the design process and the driver of innovation. These topics will be covered in the same method as before but this time the texts will initially be added to the web site rather than being printed. Table 6 (see overleaf) shows the topics that are currently under investigation.

The second element of work is to extend the use of the web site as a hub of information relating to innovation and the design process. This includes adding the new texts and establishing links with other design and related courses to enable examination of student’s work. It is intended to show the students’ projects relating to contextual design studies, describing the brief and showing some of the solutions that are developed by students.

Phase two

Despite the poor returns from the questionnaire, the number of requests for additional booklets received by the Design Council and at Brunel University and more informal responses indicated that the booklet was being well received. The content was also being used in the Department of Design at Brunel University. Therefore, a second phase of development was started at the beginning of this year.

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<table>
<thead>
<tr>
<th>How have you or will you use the sections of the booklet?</th>
<th>The Evolving Design Process</th>
<th>Designing the Future</th>
<th>Learning from the Past</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduce the topics covered in the section to your students.</td>
<td>63</td>
<td>43</td>
<td>40</td>
</tr>
<tr>
<td>Refer to the Millennium Product case studies with your students.</td>
<td>37</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>Use the project triggers.</td>
<td>37</td>
<td>34</td>
<td>29</td>
</tr>
<tr>
<td>Use the references.</td>
<td>34</td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td>Give a photo-copy to. your students</td>
<td>20</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 4: The percentages of respondents answering yes to the question of booklet usage.

<table>
<thead>
<tr>
<th>I had visited the site before reading the booklet</th>
<th>I have looked at the web site since receiving the booklet</th>
<th>I have advised my students to look at the web site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Council</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Sharing Innovation</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Millennium Products</td>
<td>29</td>
<td>49</td>
</tr>
<tr>
<td>Exploring Design and Innovation</td>
<td>6</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 5: Percentage of positive responses on web site usage.
The Design Council Sharing Innovation web site maintaining a current collection of product case studies provide complimentary material to support this teaching. The principle benefit of this research must integrate some of the finding into the teaching within the department. It has been mainly used with final year students studying a module in contextual design. This module examines current trends in the design process and new product development and encourages students to consider the direction that products may go in the next five to 10 years.

Another benefit is the new links that are being established as a result of the project. It is hoped that this will lead to further research opportunities particularly in respect of the pedagogy of the design process.

Conclusions

The project started as a means to disseminate information about the Design Council’s Sharing Innovation web site to tertiary education. It has broadened to provide a teaching resource for both tertiary and secondary education. A second phase of work is now taking place to extend the range of topics and to broaden the scope of the Exploring Design and Innovation web site into a resource hub, providing example of student work to demonstrate issues raised in the topics discussed elsewhere on the site. There is now an outreaching process underway to establish a broader network of lecturers with interests in this area to provide a more cross-disciplinary outlook, which should provide a means of developing more detailed pedagogical research.

References


Hillman, D. and Gibbs, D. (1998) Century Makers: One hundred clever things we take for granted which have changed our lives over the last one hundred years, London: Weidenfield and Nicolson


Collaborative links

As part of this process it is necessary to establish contact with other lecturers and departments to create a collaborative network. This outreaching process has begun with a workshop to discuss the project and potential collaborative links. This event involved a small number of lecturers representing a range of disciplines including product design, fashion design and design engineering. This event demonstrated that there was particular interest in the pedagogy of teaching students about the whole design continuum, whilst they are generally learning about one element of it. For example, the need to design is common for engineers and product designers though they tend to focus on different elements of products. The discussion in the workshop backed up the results from the survey that the design process was one of the most used elements of the booklet.

It is intended to continue this interaction and develop further research into the pedagogy issues raised. It is also hoped that these links will enable the establishment of greater cross-discipline working for the benefit of both the lecturers and students involved. The Exploring Design and Innovation web site will provide some of the focus for this by linking together students’ work from these different partner institutions.

Benefits

This project centres about examining current literature in the developing areas of technology and socio-economic changes that are taking place. By continually reviewing these and updating the topics, the teaching of contextual design remains at the current edge of market developments. With the Design Council Sharing Innovation web site maintaining a current collection of product case studies provide complimentary material to support this teaching. The principle benefit of this research must integrate some of the finding into the teaching within the department. It has been mainly used with final year students studying a module in contextual design. This module examines current trends in the design process and new product development and encourages students to consider the direction that products may go in the next five to 10 years.

Another benefit is the new links that are being established as a result of the project. It is hoped that this will lead to further research opportunities particularly in respect of the pedagogy of the design process.

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Table 6: New topics of research in phase 2.


**Web sites**

Brunel University (2001)
www.brunel.ac.uk/research/exploring

Design Council (2001)
www.designcouncil.org.uk/sharinginnovation