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The Use of Sustainable Design Websites Within Design and Technology Education at AS/A2 Level

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Abstract

Websites have become key knowledge and information sources within design and technology education for students. This paper looks specifically at sustainable design websites, highlighting the current literature on sustainability, and also sustainability's integration into design and technology education. This integration focuses on sustainable design schemes, such as Practical Action's Sustainable Design Award (SDA), and its website. The paper progresses to describe some initial trials to identify website use within 'designerly activity' for students aged 16-18. It examines their use of websites, in particular sustainable design sites and the SDA website, and whether these are used during their design activity. Further research that will be carried out to aid an ongoing analysis of how effective sustainable design websites are influencing design decisions is also outlined in this paper.

Key words

sustainable design, effectiveness, education, impact, methodology, website use

Introduction

Sustainable development has become a prominent part of design and technology education in recent years. Schemes such as Design for the Environment Multimedia Implementation (DEMI) (Clare 2001) led by Goldsmiths College (University of London), Practical Action's Sustainable Design Award (SDA) (Capewell and Norman 2003) and Sustainable Technology Education Project (STEP) have championed the movement within education. Additionally schemes such as the Information-Inspiration research project (Bhamra and Lofthouse 2003), led by Cranfield University and Loughborough University, are focused more on (re)educating professional designers.

Sustainability debates now appear to be commonplace in United Kingdom mainstream politics. A legislative focus on environmental, social and economic issues in conjunction with inspirational design resolutions, have begun to change the way we design and consume products. The response by businesses and designers to sustainable development, and more specifically sustainable design, has evolved over the past few years. Initially industry sought to reduce environmental impact through 'end of pipe' techniques in the 1980s. The emphasis later shifted to look at cleaner manufacturing processes that addressed issues of less waste and pollution. Currently the focus resides in a 'cradle to grave' approach that looks at environmental, social and economic aspects throughout a product's lifecycle (Bhamra 2004). The design of products, and the education of designers, has therefore become integral to the movement's success.

Bhamra (2004) identified the position of sustainability as combining technology, culture and nature, the success of which relies on the effectiveness, innovation and creativity of its implementation. Furthermore, Bhamra (2004: 564) identifies five significant features that aid the progression to sustainable design:

- initial and sustained motivation;
- communication/information flow;
- whole-life thinking;
- hands-on environmentally conscious design;
- positioning in the world.

(Bhamra 2004: 564)

With a number of design issues to balance, designers must now consider how much priority to give sustainability over more traditional design issues, such as ergonomics or aesthetics. As sustainability has become more prominent, designers have to consider the issue of weighting the pros and cons of one sustainable resolution over another.

As designers delve deeper into sustainability, the larger issues, and perhaps initial drivers, give way to a focus on detailed design. It is at this level, that sustainability issues should be integral to design decisions, rather than being approached as a separate entity. Material selection, for example, would ideally balance one material's sustainable characteristics over another. This integration is proving difficult to achieve; there is no right or wrong, guidebook or boundary line, as is the case with all designing. Design problems are ill-defined, and designers are therefore familiar with the issues of resolving wicked problems (Rittel and Webber 1973). However, sustainability is a new challenge for designers to meet. Often the starting place for

sustainable design education is to introduce the broader issues of sustainability; which frequently form the basis from which some of these detailed decisions are taken.

The emergence of sustainability increasingly relies upon the communication to, and education/re-education of, designers, teachers, industry and the general public. For student designers, this communication comes in many forms, in classrooms, tutorials, lectures, on television, in publications and electronic medium. There have been many attempts to create effective learning tools through the internet, the world's most accessible and widespread information resource. The internet could be seen as an appropriate tool for educating young people as they represent a fairly large proportion of the population of internet users. According to FIND/SVP, 30% of people who use the internet are between the age of 18 and 29. It should be noted that because of the nature of the internet, it does have its limitations in terms of information and teaching. The information present may not necessarily be correct or reliable. In this investigation however, websites that are government funded or led by recognised institutions will be focused upon in order to reduce any doubts over reliability.

In design and technology education, sustainable design websites are often used as key information tools for students to refer to. This investigation focuses on the effectiveness of such websites. This area takes a greater importance when you consider sustainable design as an evolving area that designers struggle to prioritise. An increase in computer competency and accessibility of the internet has led to an influx of websites on this subject, but little work has been done on these websites to assess their effectiveness.

The Design for the Environment Multimedia Implementation (DEMI) project (Clare 2001) invested a significant amount of money, time and effort into a sustainability resource website. DEMI has since run out of funding and the website and its influence, if any, is lost. In contrast, Practical Action's SDA (Capewell and Norman 2003) was another sustainable design project aimed at helping to integrate sustainable ideals into design and technology education. The SDA project has now also reached its end. The SDA team are endeavouring to maintain its website as a way of continuing to contribute to this area of sustainability education.

Initially this research study analysed a wide-range of sustainability websites and their content in an attempt to categorise and focus on a smaller sample of websites. The paper (Simmons and Badni 2006) presented at the Design and Technology Association International Research Conference in 2006 outlined a usability study that took into account 25 leading sustainable design websites and analysed them for sustainability content.
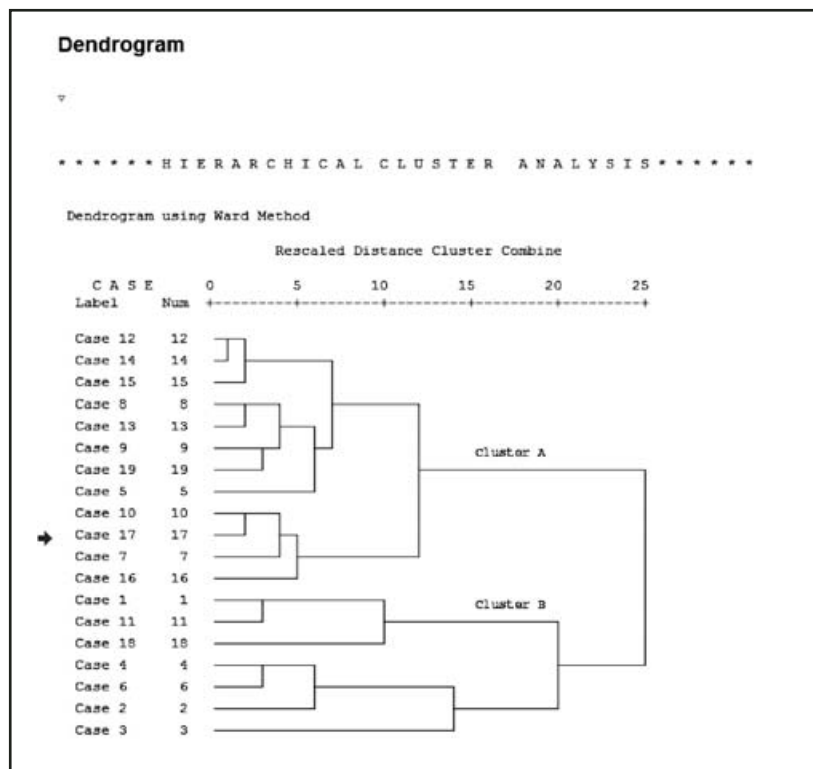

Figure 1: Cluster Analysis on the websites' content

The content analysis graded the websites content from 1-5 on the amount of information about a specific area of sustainability (as illustrated by the design webs in Figure 2). A rating of 5 would indicate a lot of information about an area or a rating of 1 would mean there is little content. A cluster analysis then grouped these websites into two main clusters based upon how they rated in this content analysis; cluster A and cluster B.

The clusters have identified two main types of website. Cluster A are websites that mostly give direct information, contained on the website itself. Cluster B contain websites such as sustainable forums and hubs that link to other external websites.

The investigation has become more focussed since this analysis, looking at sustainable design scheme websites from Cluster A such as the SDA and Information-Inspiration. Figure 2 shows an example of two of the content diagrams presented in 2006 for these two websites.
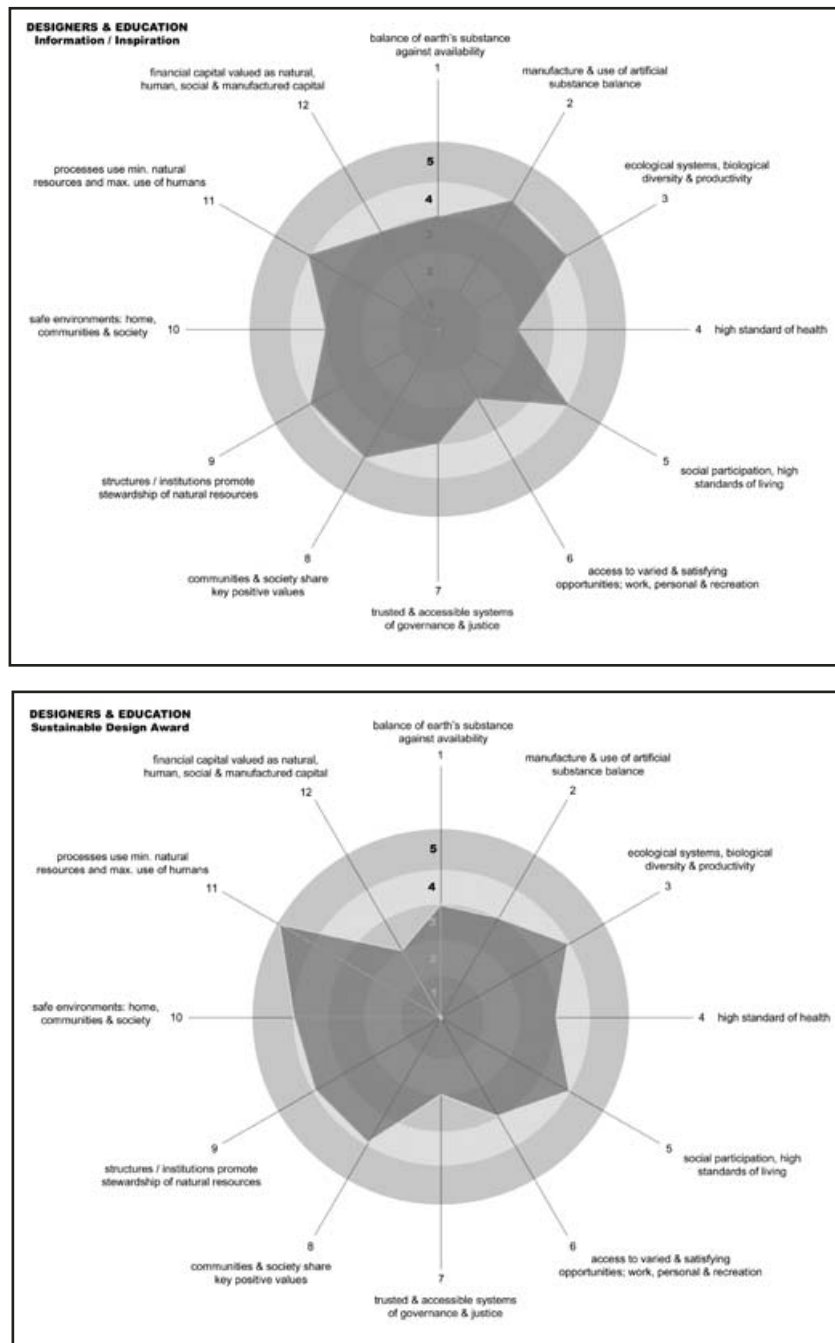

Figure 2: Website content diagrams for the SDA and Information-Inspiration websites (Simmons and Badni 2006)

All of the initial twenty-five websites aim to inform young designers of the issues surrounding sustainability. They also aim to guide their design decisions by giving them access to more specific sustainable information. Their success may be determined by analysing how effective they are at communicating the information, *before use*, *during use* and *after use*.

Generally website assessments fail to consider all of the areas of website effectiveness (Simmons and Badni 2006) and therefore it is very difficult to define. There is little prior art on which this research can be based (Simmons 2006). Most website assessments are focussed on usability or aesthetic value, but whether the websites are effective in influencing designing is left to chance.

In this paper, the results of a series of classroom surveys and feedback sessions about website use in designing are presented. The findings help to show how websites in general, sustainable design websites and the SDA website, are used in design work at AS/A2 level, and at what stages these websites are used during the act of designing. These inputs are part of a wider study that has employed various research methods to help gain a greater understanding of a website's effectiveness. The methods included; questionnaires, usability checklist analysis, user interviews, classroom inputs and folio tracking.

Classroom inputs

To gain information on the impact and effectiveness of sustainable design scheme websites, it was felt that trials in the classroom environment were needed in order to assess if these websites have been effective in influencing design decisions. Initially these trials were to gain feedback on the current impact and usage of websites in design education in a broad sense, and then more specifically looking at sustainable design and the SDA website.

The questionnaires derived from the research questions that related to the user of websites during design work and at what stage that usage took place. The questionnaire was initially trialled with eleven students at John Bentley School in Wiltshire, after this, these questions were refined to those shown in Figure 3. After a questionnaire (Figure 3) had been completed an input was given that pointed students in the direction of the SDA website to raise the awareness of the website. Further trials are planned to assess what impact this presentation had. The results from these questionnaires are presented below.
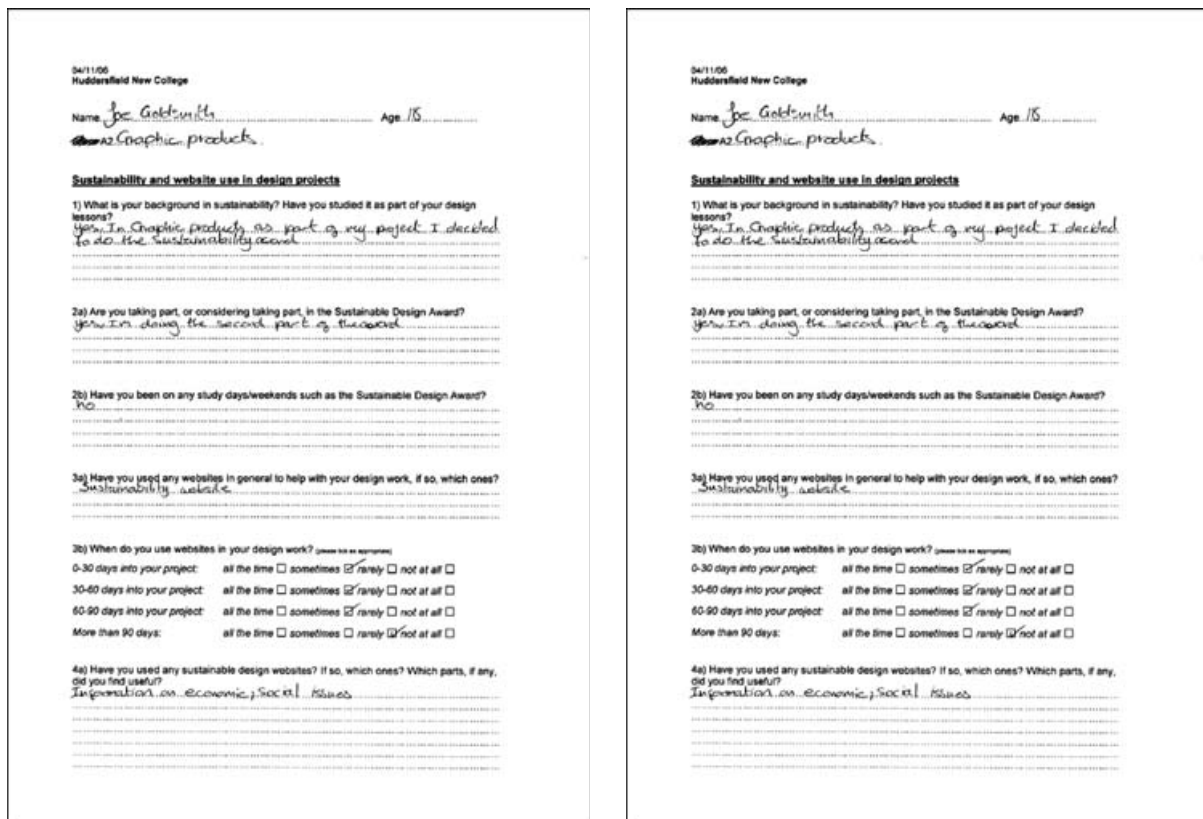

*Figure 3: Example of the website use questionnaire. *note 'all the time' was explained as every two days*

Sustainability background

What is your background in sustainability? Have you studied it as part of your design lessons?	Yes	Some	None
	38%	40%	22%

Are you taking part, or considering taking part, in the Sustainable Design Award?	Yes, I am	I intend to	No, I'm not
	35%	33%	32%

Have you been on any study days/weekends such as the Sustainable Design Award?	Yes	No
	25%	75%

Table 1: Students' backgrounds concerning sustainability

Five schools were looked at covering 72 students aged 16-18, as Table 1 shows, 38% have studied sustainability as part of their design lessons, 40% had some classroom input on sustainability and 22% of students have reported they have received no sustainability education.

This would support the notion that sustainability is prominent in design and technology education. Nearly two thirds of the students questioned had taken or intended to take the SDA, but only 25% of all the students had attended an SDA study day.

General website use

Have you used any websites in general to help with your design work?	Yes	No
	79%	21%

At what stage in designing are they used?	Every two days	Sometimes	Rarely	Not at all
0-30 days in your project	35%	44%	7%	14%
30-60 days in your project	14%	46%	23%	17%
60-90 days in your project	6%	35%	36%	23%
More than 90 days in your project	7%	21%	35%	37%

Table 2: General website use in design projects

The results shown in Table 2 refers to days related to their major project at AS/A2 level, it shows that 79% of students use websites during their design work. The table indicates website use is fairly frequent early on in their design work and as the project progresses this usage fades, 35% use websites every two days in the first 30 days of designing, and 44% use it some of the time. These percentages drop to 7% and 21%

respectively after 90 days of a design project, indicating significantly less use as projects move on to more hands on and perhaps evaluation activities. For design projects that run for more than 90 days there is a substantial increase in those students that do not use websites at all in their design work.

Sustainable design website use

Have you used any sustainable design websites?		Yes	No
		52%	48%

At what stage in designing are they used?	Every two days	Sometimes	Rarely	Not at all
0-30 days in your project	9%	29%	15%	47%
30-60 days in your project	6%	19%	21%	54%
60-90 days in your project	0%	17%	25%	58%
More than 90 days in your project	0%	13%	19%	68%

Table 3: Sustainable design website use during design projects

Table 3 shows the use of sustainable design websites during design practice at AS and A2 level. The findings indicate that approximately half of the students questioned have used sustainable design websites, the other half have not.

However, when asked to identify their usage throughout designing, the percentage of regular website use is very low with around half the students not looking at sustainable design websites at all throughout their project work. Around a third of the students use sustainable design websites sometimes during the first 30 days, although again this use decreases as projects are developed. Around half of the students did not use sustainable design websites at all throughout their design work. The number of students not using websites at all during their projects increases considerably after 90 days when 68% of students are not using websites.

When this data is considered with the data in Table 2, the use of websites in design is high, but sustainability websites are only a small part of that use. It could be inferred that sustainability's prominence in design and technology education, for website research, is low, and that the students use websites to help with other areas of design. With half of the students not even looking at sustainable design websites it would indicate that the 'before website use' phase needs to be improved if sustainable design websites are to be used by students at all. This may focus on raising the awareness of these websites or an initiative to attract them to the websites in the first place.

Sustainable Design Award website use

Have you been on the Sustainable Design Award (SDA) website?		Yes	No
		28%	72%

At what stage in designing are they used?	Every two days	Sometimes	Rarely	Not at all
0-30 days in your project	11%	9%	2%	78%
30-60 days in your project	2%	15%	4%	79%
60-90 days in your project	0%	6%	14%	80%
More than 90 days in your project	0%	2%	12%	86%

Table 4: Sustainable Design Award website use during projects

Table 4 illustrates website use during designing, specifically concentrating on the SDA website. Of the 72 students questioned 28% said that they had been on the SDA website. Only 12% accessed the websites at least every two days during the first 30 days, 9% some of the time and 2% rarely used it. The majority of student designers did not use the SDA website at all in their designing. This may be slightly misleading however, if you consider that only 28% of them had been on the website in any case, the majority of that percentage did use the website at some point during their project work. Those students who have been on the SDA website seem to be using it early on in their design work. But a large number of students have not even accessed the website in the first place suggesting that again the 'before use' phase of website effectiveness maybe key to improving the websites' impact on student designers.

For the students that did access the website, the data indicates that as their design work continues, website use decreases. It would be reasonable to assume that this maybe due to design decision-making becoming less frequent, as ideas are progressed, with the designers perhaps undertaking other activities.

Further information was also gathered at these feedback sessions indicating which websites they used, which part of the SDA website they had looked and which parts they liked and didn't like.

In order to progress some of these results further, several follow-up studies are to take place. These include:

- folio tracking – looking at student work (design folios) to see at what points websites are referenced or referred to;

- student interviews – students retrospectively talking through their work and indicating at which points these websites were used;

- one-to-one inputs – giving students advice on how specific sustainable design website may help with their project work.

The follow-up studies should allow for analysing the effectiveness of several types of input to support the websites; for students with a sustainability background and those without, those with a general input from the first trials directing them to the website, and those with a one-to-one input pointing them to specific areas of the SDA website. These trials should help to contribute towards a comprehensive review of the effectiveness of sustainable design websites in influencing design decisions.

Conclusions

Several conclusions can be drawn from the classroom input results shown in Tables 1 to 4. The results indicate that it is common practice to introduce sustainable design issues to pupils in the United Kingdom, with 78% of the students questioned having taken modules or have had some sustainable design input. The data also shows that 68% of the students had taken or were intending to take the SDA scheme.

79% of the students used websites during their design project work. However only 52% used sustainable design websites and 28% had used the SDA website. This would indicate that a large number of students are not considering sustainability when looking for design information and resources on the internet, and that their focus is on other areas of design.

The other main conclusion that could be drawn from this data is that around 80% of the students had not accessed the SDA website at all. Of the students that did access the website, they did use it throughout their design work. This suggests that a greater emphasis in motivating students to use the SDA website in the first instance is needed. Several inputs focusing on raising awareness of the website during the 'before website use' phase are therefore proposed as part of a wider study on website effectiveness.

When comparing the stages of designing in which these websites are used for each of the categories; general websites, sustainable design websites and the SDA website (Tables 2, 3 and 4), it maybe inferred that these websites are all used the most during the first 30 days of the students project work. The results also show that as the student's progress with their projects, the students' website use decreases. This would appear to be a result of a change of activity as their design projects evolve.

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