Student use of internet resources in the context of design and technology project work

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Student use of internet resources in the context of design and technology project work

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Abstract
This paper reports a pilot study concerning the use of Internet based resource materials amongst a group of undergraduate students. The aim of the study was to examine the extent to which students were using the Internet to support client based technology project work. In addition, the students' perceived valuation of these resources in the context of practical project work was examined.

A cohort of one hundred final year students of Industrial Design and Technology was involved in a client based design project. Data collected from seventy-one students via a questionnaire identified that all students had used the Internet facilities of the University.

Subsequent to the questionnaire, interviews were held with six selected students who showed a strongly positive or negative response to using the Internet to support their project work. The paper discusses key factors influencing student engagement with this resource during the process of designing. The results indicated that most students accepted the resource was useful. Perceived barriers to its more widespread use were slow downloading of information, access to computer facilities and the cost in time and money to learn and use the software and hardware involved. The paper also highlights the need for considered design of both questionnaire and interview schedule when studying student cohorts.

Background

The use of the Internet, in all its different forms, continues to rapidly grow. In parallel to this expansion in access and use, the number of contributors of material to the Internet continues to increase. Material from commercial organisations, charity and voluntary groups, government agencies and individuals provides the content of the information network, allowing users access to a very wide variety of information and resources.

The Internet derived from INTERnational NETwork links between over ten million computers in more than one hundred countries. One technical definition of the Internet describes it as a network formed by the co-operative interconnection of computing networks (Cady and McGregor, 1996). However, the difficulty in defining exactly what the Internet is arises from the ways users manage the resources of the Internet. Interpretations of the Internet are largely personal and based on experience gained through participation. One aspect is clear: the Internet is a vast resource of selective information available for access by computer.

> The Net is possibly the largest store of information on this planet. Everyone can be part of it; it is one of the few places where race, creed, colour, gender or sexual preferences do not prejudice people against others. Communication is the key. People talking to people. The Net is not computers, that is just the way people access it. The Net is people helping each other in a world-wide community. (Cooke, 1994 cited in Meraldi, *et al*, 1995)

The basic tools of the Internet include e-mail, USENET newsgroups, file transfer protocol (FTP), Gophers and the world wide web (WWW). These tools are essentially concerned with access and retrieval of information, as opposed to tools that engage the user in role play or simulations with computers or other users, normally referred to as multiple user dimension or multiple user dialogue (MUD).

Electronic mail, (e-mail), is one of the simplest and most frequently used Internet tools. It allows the user to communicate with other users by sending text messages. The benefits of e-mail over conventional mail are becoming increasingly evident as organisations switch to this technology. The exchange of a variety of different files using e-mail, such as word processed information, graphic images and other electronic multi-media materials, highlights the versatility of this method of communication.

USENET news groups operate through a global conferencing network that facilitates public discussion. A series of electronic magazines, or forums, are available to users of the Internet. Users can subscribe to these groups at no cost and observe or engage in a discussion that takes place between participants. The discussion is usually dynamic, with or without mediation, and can be a very useful source of advice and information. A typical news group is the PIClist, dedicated to users of microcontrollers. Here, discussions can range from technical enquiries through to educational and social matters; the diversity of discussion is limited only by the minds of the contributors.

Telnet is the name of an Internet protocol that enables a local (or client) user to log on to a remote server or host as if it were another terminal the that server (terminal emulation). FTP is a program that allows users of the Internet to move files from one location to another. FTP sites are valuable archives of resources, containing an abundance of information, including data files and computer programs that are in the public domain.

Gopher allow users to access Internet sites and to view information through a series of hierarchical menus. Each time a user selects a new menu, Gopher connects to the host computer and retrieves the data contained therein. The WWW effectively took over from Gopher.

The WWW integrated a number of existing Internet tools such as e-mail and FTP into a single package. It made access to the Internet much easier through what are essentially non-technical tools, based around Hypertext Transfer Protocol (HTTP). Information is displayed in pages, each page consisting of test, pictures, sound, animation and video. Pages are interconnected through the use of hypertext protocol.

The development of the WWW in the early 1990s boosted access to the Internet by offering users a consistent and relatively straightforward presentation to what is a complex and frequently confusing system of information.

Against this background of technical development and improvements in access to the Internet the researchers sought to investigate a number of issues relating to how undergraduate students access and use different Internet resources during engagement in technology project work. As Sangster suggests, the WWW represents a new concept in technology, the library on your desk top, the dictionary at your fingertips, the sound at your ear. There is nothing that we see or hear that will not be available through the WWW (Sangster, 1995)

Subject group

The subject group for the study were 103 third year students of Industrial Design and Technology who were involved in client based design projects. Three students were on an Erasmus exchange from Productontwikkeling, Hogeschool, Antwerp, Belgium. The student group was made up of 13 females and 58 males. The age range of the student group was between 21 and 45. Seven students were over 21 years old.

The student projects had been established by each individual working in collaboration with an industrial client and involved the specification, design and prototyping of a product. Each project was conducted over a twenty two week period covering two semesters, as part of module for this degree programme.

The students had access to SUPERJANET via a student server. The students had their own identification code to log on to the server and their own e-mail address. The e-mail software

used by the students was ELM version 2.4 and HTML browser software was Netscape version 2.2. Physical access on campus was through University computer laboratories located around the campus or through Internet links provided in a number of the rooms within halls of residence on campus. Students have to provide their own computer when using halls-based links. Some students also had a link to the University system through a modem and telephone link from their homes.

The students had received demonstrations on how to use the software and hardware during their first year and were then encouraged to continue to use e-mail and WWW based resources within modules in the first and second year.

Method

Two data collection instruments were used:
1 a questionnaire completed by 71 students;
2 individual interviews with six students.

The questionnaire and interview schedules can be seen in Appendix I and Appendix II respectively. Students were sampled at the end of the project, when the work had been presented for assessment. Students were also asked to comment on the usability of the IT service provided by the University. Not all the information collected has been documented in this paper. Further processing of some of the results is required and will be reported at a later date.

The questionnaire asked the students to comment on the frequency of their use of the Internet and the quality of the information they found to support their project work. The questionnaire was given to the students at the end of formal lectures in Semester Two of their final year. The students were briefed on the purpose of the study and the type of information about which the students were being asked. It was emphasised that the students should reflect on the information they had obtained through the Internet for use within the design projects they were about to complete. They were also asked to reflect on the quality of the information found on the WWW sites accessed. The questionnaires were then collected by the authors.

Within the questionnaires three categories were used to determine the quality of information found: excellent, (reflecting a positive response); adequate; and poor (reflecting a negative response), these providing a scale of the students' opinions. The short timescale available for the authors to access the student cohort between finishing their projects and final assessments inhibited longer questioning about an individual student's perception of excellent, adequate and poor relating to WWW sites. To substantiate the comments made about quality of information found on WWW sites a small group of students were interviewed individually. The students selected for interview were those who showed a strongly positive or negative response in the questionnaire towards using the Internet to support their project work.

From a Year Three student group of 103 students, 71 returned the survey questionnaire. The returned questionnaires were converted into a database using Claris FileMaker Pro version 2.1. The questionnaire had been originally designed on this system. The data were then exported into a spreadsheet using Excel version 4.0 and parts of the data converted to charts for ease of analysis. The findings results are documented below.

Findings

Through the questionnaire the students were asked to indicate the following details about frequency of IT usage: type of information accessed from sites, and the quality of the information found. Students were also asked about the type of IT software used and the location from it was accessed.

The number of hours students spent using the Internet ranged between less than one hour per week to ten hours per week, the average for the group was 1.3 hours per week. The number of hours spent using the Internet at the weekend varied between less than one to seven hours, the average usage time was 3.5 hours.

Of the IT tools available to the students, all used the WWW, 86% of students used e-mail;
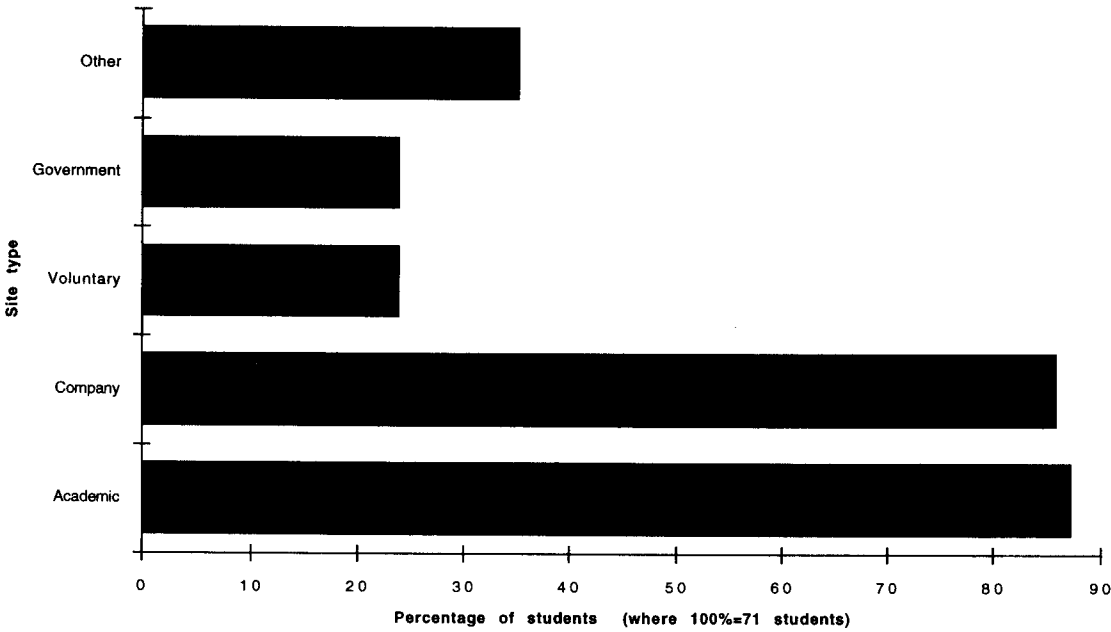
Figure 1 Sites accessed by students.

but only 16% used USENET discussion groups. The number of times the students logged on to Internet per week ranged from less than once per week to five times per week. On average the students logged on to the Internet once or twice per week.

The majority of students had accessed both academic and commercial sites.(See figure 1) Only 24% of the students accessed the Voluntary Groups. The level of access by students was the same for Government sites. There was a larger number of students who were accessing sites they considered to be outside these classifications, placed under the title of Other sites. The sites accessed by this group included hobbies, entertainment and personal WWW pages. Students who accessed sites alternative to those in the questionnaire made up 35% of the total. Comments on the perceived quality of information found on the sites are shown in Figure 2.
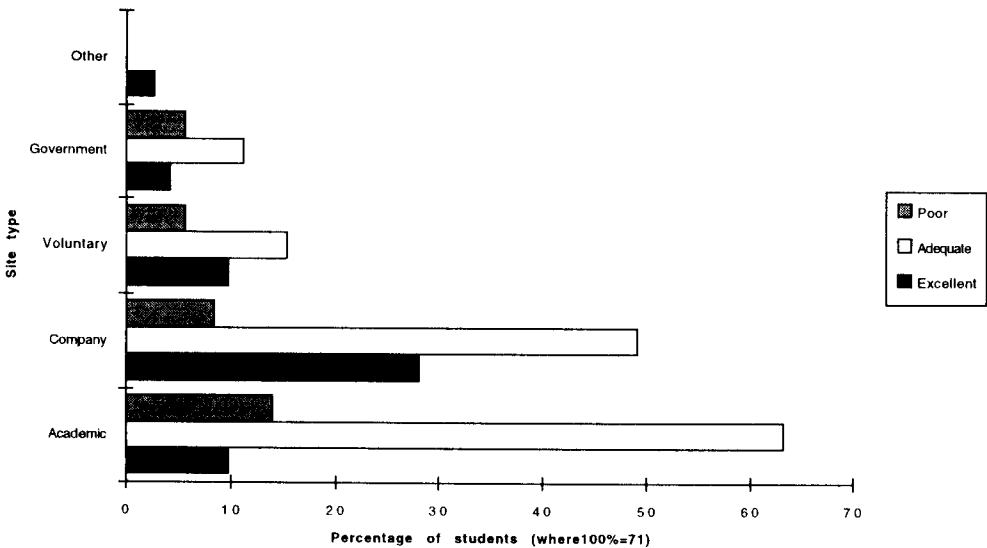

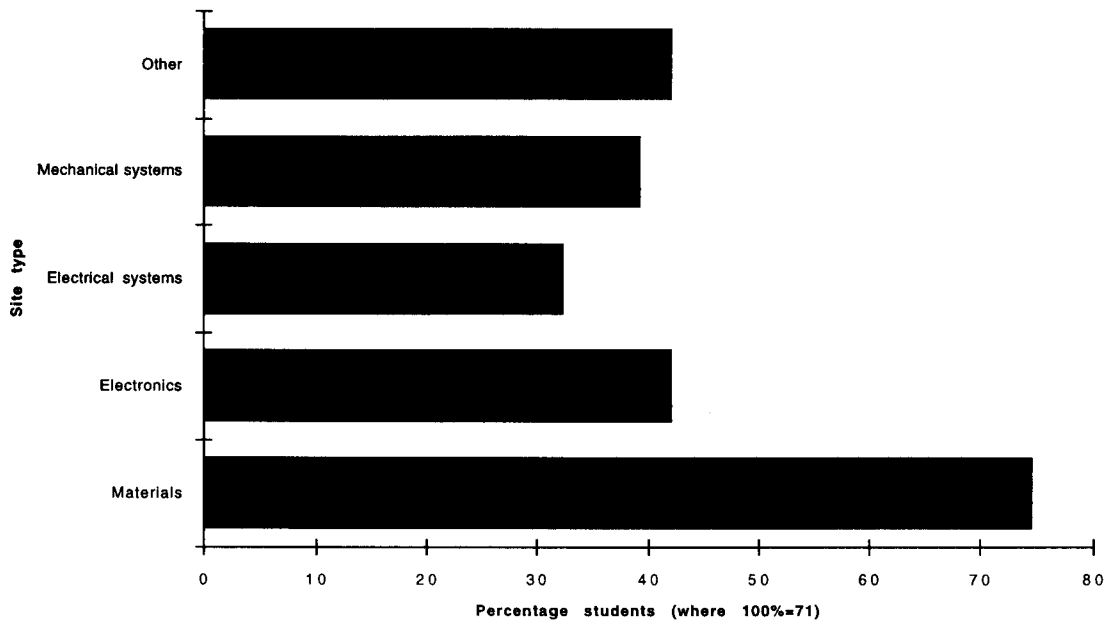Figure 2 The perceived quality of information found on WWW sites

Figure 3 The percentage of students accessing technical information WWW sites

The results in Figure 2 shows that most students found the quality of the information on the WWW sites adequate. It is noticeable that the commercial sites were perceived as providing the best quality of information. Looking in more detail at specific types of information being accessed from WWW sites comments were gathered about technical, company and user sites, and are shown in Figures 3, 4, 5 and 6.

The section titled Other sites within the field of technical information was made up of sites that included technical subjects ranging from archaeology, design history, ergonomics, housing, shareware to CAD-CAM suppliers. The section titled Other sites within the field of user information included details on: children, leisure, sports and ergonomics. More students accessed the technical information sites than the user information.
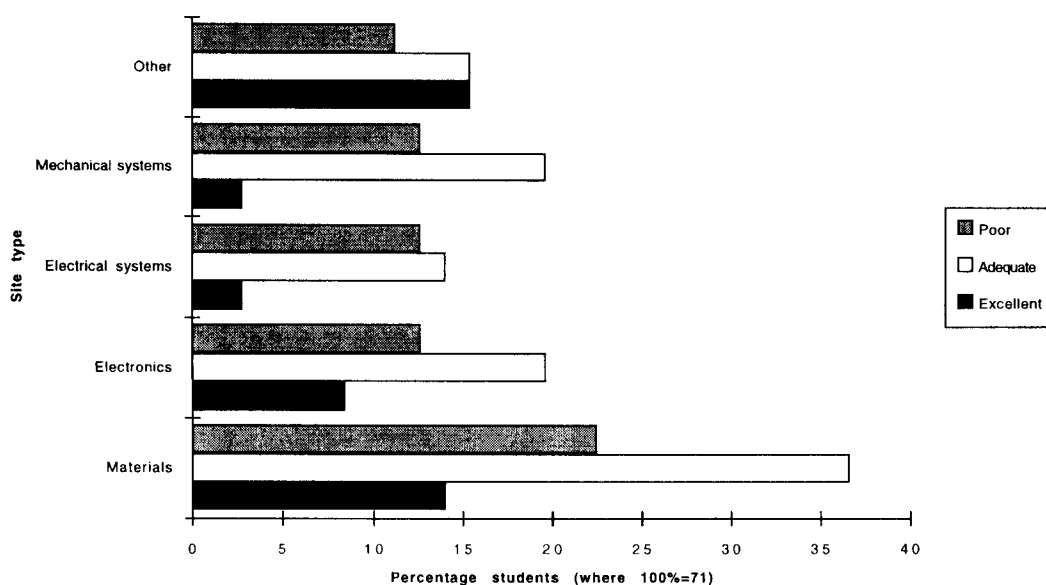

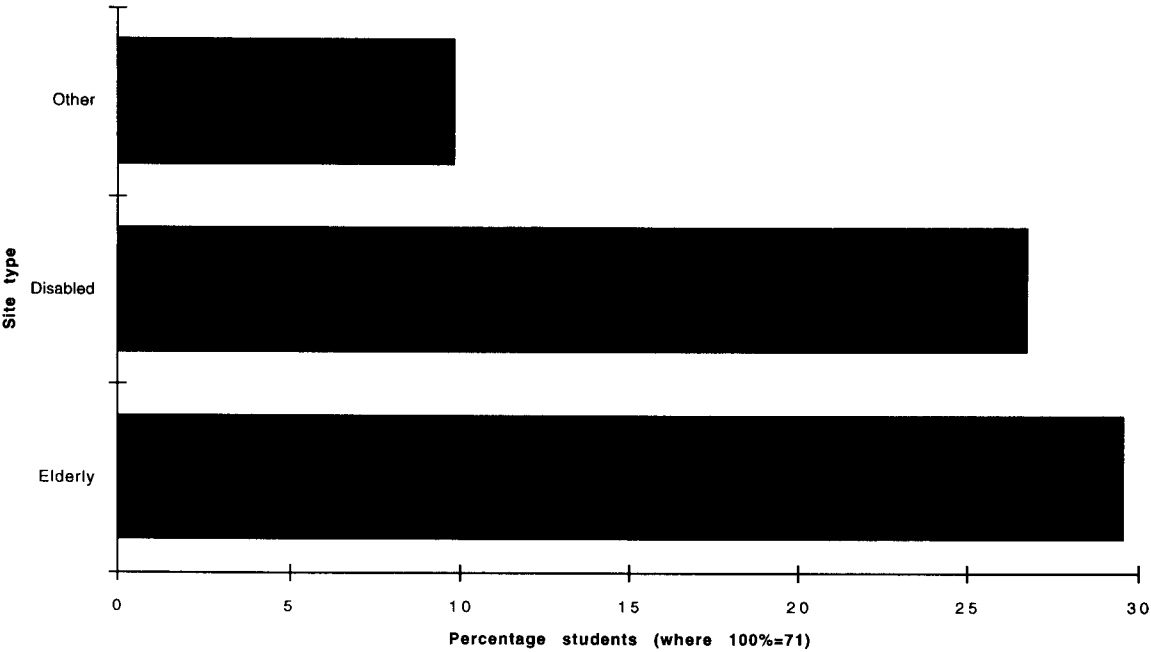Figure 4 The perceived quality of technical information on WWW sites

Figure 5 The percentage of students accessing WWW sites for user information
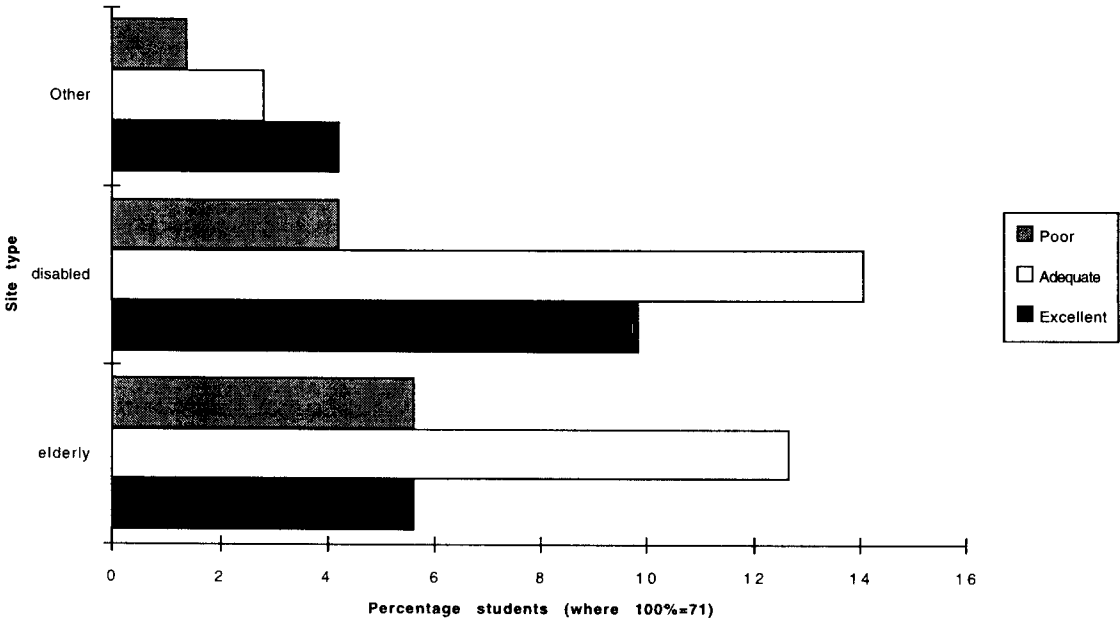

Figure 6 Students' perception of the quality of user information held on WWW sites

When the student group were asked about the usability of the University Internet service, the responses to the question were that: 70% thought the service was 'okay', 23% students thought it was easy to use; 7% found it difficult to use.

Although the majority, 90%, of the students accessed the Internet through the computer laboratories PC labs, 7% used a computer through their hall link, while 8% of students used a modem with their computer. Further questions showed that 34% of the students indicated they were registered with a commercial provider, 13% of whom said they were registered through the University, 24% through a link at home and 4% through work contacts. Some of the students had indicated

they used more than one method of accessing the Internet through University and commercial facilities.

Conclusion

The findings showed that most students had used University Internet facilities during their work within the course. Highlighted problems from those interviewed were accessibility, costs involved in print-outs, disks and other consumables related to producing hard copies of electronic information.

Both physical and electronic accessibility were the main concerns of those interviewed. Slow processing by the SUPERJANET network and the time required to come 'up to speed' with the software and hardware packages were also cited as disadvantages to using the facilities. Timetabling of the computer laboratories obliged students to use the facilities out-of-hours more than they felt acceptable. A number of students expressed extreme views about the usefulness of the information that was obtained. Age did not seem to be a factor in determining a student's opinion as there were mature students for and against the use of available Internet tools.

Much of the perceived quality of information found depended upon the accuracy of the search and the speed at which the student could obtain the information. Those students who were not willing or able to work unsocial hours to obtain the required information effectively and efficiently from the Internet used more traditional paper-based methods of information retrieval. Slow downloading during office hours, particularly in the afternoon when the United States of America begins its working day, was a common complaint from the students interviewed. So, for them, the traditional approach was preferable to less familiar methods of working. Further research is required to find out which format or combination of retrieval formats may be better for Design and Technology students to use.

Those students who had mastered the use of the Internet were found to be knowledgeable on the University systems and other more sophisticated multi-media software operating programs such as JAVA. Two of the three students interviewed for their positive views of the Internet were involved in writing WWWeb pages for themselves and had been approached by commercial organisations to produce their pages. They had found the wealth of information available, particularly from commercial sites, to be very useful to their project work. The students found accessing experts in the field relating to their project development straightforward through USENET discussion groups and direct e-mail messages. The students interviewed commented that the contacts made had also provided work opportunities for themselves and other students they knew who used the Internet.

Further development of the use of information technology tools within the modules taught by the authors may include a more focused approach to the IT facilities available to students on campus, with an alternative method of information retrieval available to those students without the resources of time or money to use the Internet.

On reflection, the information gathered relating to the students' perception of the quality of WWW site information cannot be considered reliable. An explanation to the students of what the categories: excellent, average and poor were intended to mean within the context of their valuation would have focused the students' responses and made them better commensurable. However, the results give an indication of the students' feelings towards the information available on the Internet. The pilot study has highlighted issues that require further investigation such as: is the Internet a better way of finding out commercial information than paper-based formats? how can usability at peak times be made easier? and how useful is the information to Design and Technology-based projects?

References

- Cady, G.H., McGregor, P., *Mastering the Internet*, Sybex:USA, 1996 Meraldi, Z., Blamire, R., Brown, M.C., Kenny, J., *Highways for Learning*. NCET:Coventry, 1995.

- Sangster, A., World Wide Web - What can it do for education ?, *Active Learning* 2, July 1995.

Appendix I Questionnaire sheet

USING THE INTERNET TO SUPPORT DESIGN PROJECTS

Name
Family name _____ First name _____

Date of birth: Day ☐ Month ☐ Year ☐

Male/Female ☐

Course Code: H775/6 /XH77 ☐

1 What do you estimate to be the typical amount of time that you spend using the internet ?
- Number of hours per day ☐
- Number of days per week ☐
- Number of hours each weekend ☐

2 What do you estimate to be the typical number of times that you log on to the internet ?
- Number of times per day ☐

3 Which tools do you use during these periods of internet use ?   Tick appropriate boxes ☑
- World wide web sites ☐
- Usenet ☐
- Email ☐
- Other ☐ Please specify _____

4 Which types of site do you access during these periods of internet use ?   Tick appropriate boxes ☑

Quality of information
(Excellent / Average / Poor / None found)
- Academic ☐☐☐☐
- Commercial ☐☐☐☐
- Voluntary groups ☐☐☐☐
- Government ☐☐☐☐
- Other ☐☐☐☐ Please specify _____
- Other ☐☐☐☐ Please specify _____

5 Which types of material do you access during these periods of internet use ?

Technical information   Tick appropriate boxes ☑

Quality of information
(Excellent / Average / Poor / None found)
- Materials information ☐☐☐☐
- Electronics ☐☐☐☐
- Electrical systems (motors, switches etc) ☐☐☐☐
- Mechanical systems/components ☐☐☐☐
- Other ☐☐☐☐ Please specify _____
- Other ☐☐☐☐ Please specify _____

Company information
- Potential projects ☐☐☐☐
- Potential project sponsors ☐☐☐☐
- Other ☐☐☐☐ Please specify _____

User information
- Elderly ☐☐☐☐
- Disabled ☐☐☐☐
- Other ☐☐☐☐ Please specify _____

6 Are you presenting your own information on the internet ?   Tick one or more boxes ☑
- Yes ☐ → Design work ☐ / Curriculum vitae ☐ / Email discussion groups ☐
- No ☐

7 How do you keep useful information obtained on the internet ?   Tick one or more boxes ☑
- on disc as html ☐
- on disc as text ☐
- as html printout ☐
- as text printout ☐
- as image files ☐

8 Do you sample other media in the context of design project work on the internet ?   Tick one or more boxes ☑
- sound ☐
- images ☐
- movies ☐

9 Do you use modified images in the context of your design project work on the internet ?   Tick one box ☑
- Never ☐
- Sometimes ☐
- Frequently ☐

10 How would you describe the university internet service
- Easy to use ☐
- Reasonably OK to use ☐
- Difficult to use ☐
- don't know ☐

11 How do you access the university internet service   Tick one box ☑
- PC labs ☐
- PC in hall ☐
- PC in study ☐
- Modem ☐

12 Are you or your family registered with a commercial internet service provider ?   Tick one or more boxes ☑
- Yes ☐ → at university ☐ / at home ☐ / at work ☐
- No ☐

13 List up to six POSITIVE points about the internet in the context of DESIGN PROJECT WORK
_____
_____
_____
_____
_____
_____

14 List up to six NEGATIVE points about the internet in the context of DESIGN PROJECT WORK
_____
_____
_____
_____
_____
_____

Appendix II Interview schedule

Questions for follow-up to questionnaire

1 Access issues:
Is access a limiting factor in using the Internet for support of design projects?

To hardware at University
                  at home

To software for WWW
                  for e-mail

2 Content for design activity
Is the current set of information available useful for student designers?

What is good about the information found?
• using the WWW
• using USENET
• using e-mail

What could you not find that would have supported your design projects?

3 Presentation
Is information found in a format that is intelligible by student designers working on projects?
    Is it easy to see the information?
    Is it easy to interpret the information?
    Is it easy to extract what you needed?