Paper 3:

Teaching over the Internet: How is the UK's Open University doing it?

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Summary

- Will the Internet becoming the main delivery and communication medium for Life Long Learning? At the Open University in the United Kingdom the Internet provides teaching and learning opportunities for courses in the domains of Computing, Technology, Arts, Science, Social Science, Education and the Open Business School. This paper discusses the issues arising from the many pilot studies which have taken place to date and includes data from our larger scale survey with 29 course teams and suggests a future research agenda for this area.

Introduction

- Distance Learning Institutions world wide are starting to explore how they can use the Internet to enhance their teaching methods and improve their students' learning experience throughout life. In 1997 the business community started to take real notice of the Internet, Vetter and Kroeker, (1998). Warren (1998) discusses business use of on-line communities to exchange information. This bodes well for the Internet becoming the main delivery and communication medium for Life Long Learning. The Open University (OU) in the United Kingdom, has delivered part-time open distance learning courses to mature students for more than a quarter of a century. Many of these students hold down full time jobs while studying. Each year between 150,000 and 200,000 students enrol on 300 different courses at either undergraduate or postgraduate level.

For many years the OU have seriously considered technological means such as the Internet to engage these students in different types of interaction. They have continually sought new ways to present their teaching materials, pioneering new methods with small groups of students before adoption for large population courses. This paper discusses the issues arising from the many pilot studies which have taken place to date and includes data from our larger scale survey with 29 course teams and suggests a future research agenda for this area.

The Internet

- The Internet and the World Wide Web (WWW) are often seen as synonymous. Perhaps a better way to view the Internet is as a mechanism or means which supports different sorts of software application. On a more basic level, this could be email messages, or messages to Newsgroups while on a more ambitious scale this might be the use of video, see Vetter and Kroeker (1998). The Internet itself is basically a vast network of computers which are linked together and each computer on this network stores information. To access this information you need to use software Tools. Perhaps one of the more familiar Tools is the Netscape browser.

A student or tutor using the Internet with the right software is able to make use of : email, conferences, Newsgroups, WWW browsers, Internet relay chat, Real audio, video, access databases and libraries. All of this software has been tried out at the OU to various degrees by a number of pilot projects. The Technology Department pioneered the use of Electronic communication, see Mason, (1989), Alexander and Mason (1994). However the first leading edge use of the Internet was by Social Sciences in 1994. The Virtual Summer School used the Mosaic WWW browser and CU-SeeMe software with 12 students in addition to Softarc's FirstClass conferencing system (copyright 1994 Softarc Inc.), see Issroff and Eisenstadt, (1997). These types of innovation with leading edge technologies are encouraged with small project groups. Mainstream distance learning courses however are supported by the university's Academic Computing Service (ACS) who gradually adopt new techniques where appropriate. For the OU's mainstream courses in 1997, the Internet has meant a system which supports the following Internet Tools supplied in a pack :

Internet Tools provided

- Netscape browser
- Telnet
- FTP
- Gopher
- Archie
- Ping

Table 1 Internet Tools students used.

Therefore the OU has investigated new Internet Tools as they have become available with small numbers and as early as 1995 used these Internet Tools on the THD204 Information Technology course with 1,500 students. Our survey with 29 course teams indicates which Internet Tools were being used, for what purposes and by which subject domain, see the section 'The OU and the Internet'.

Internet Issues identified by researchers

- The number of users on the Internet is still growing and new developments offer new facilities year on year. However there are problems with usage of this medium for educational purposes. A number of these have been identified and include:

  - **Teaching and support structures** - the introduction of new technologies has caused confusion about staff roles. Where do the boundaries come between teaching and supporting new technology. (Issroff and Eisenstadt, 1997; Thomas et al, 1996; Levy, 1997; Klark and Udi, 1995; Sumner and Taylor, 1998; Nkambou and Gauthier, 1996)

  - **Orientation and overload** - the Internet holds vast amounts of information which can baffle the student rather than assist their learning. (Soloway 1995; Langenbach and Bodendorf, 1997; Brandt, 1997; Dieberger, 1997; Sloane, 1997; Klark and Udi, 1995; Wilson Whitelock, 1997c)

  - **Collaboration** - personal and Newsgroup messages can be sent over the Internet from a variety of software applications including FirstClass. However conferencing and the collaboration it encourages is still in its infancy on the Internet. (Collis 1996; Bentley et al 1997; Warren, 1998.)

  - **Technical issues** - the introduction of new technologies inevitably causes teething troubles for new users. (Murphy, Cathcart, and Kodali, 1997; Berge, 1996; Levy, 1997; Wilson, and Whitelock, 1997a; Wilson and Whitelock, 1997c; Warren 1998)

  - **Cost considerations** - the initial use of new technology is expensive for both universities and students. For universities it's staff to student ratios and for students it's telephone bills and upgrading equip-

ment. (Issroff and Eisenstadt, 1997; Thomas et al, 1996; Sumner, and Taylor, 1998)

- **Immediate information** - contact between students and tutors is asynchronous in most cases and it is difficult to maintain momentum. Also Web pages are not always updated as quickly as they could be. (Thomas et al, 1996, Price and Petre, 1996; Sumner, and Taylor, 1998)

The OU and the Internet.

- In 1997 courses which used the Internet for teaching and learning at the OU were not just in the computing domain but cut across the Arts, Computing, Science, Technology, Social Science, Education and Open Business School (OBS) areas. In fact our questionnaire based survey which included feedback from 29 course teams showed higher numbers using the Internet in Arts (7 out of 29 courses) and OBS (5 out of 29 courses) than Computing (3 out of 29 courses). Twenty out of the twenty-nine course teams surveyed saw the Internet as providing relevant course materials, and a valuable component in the actual teaching of the course, see Figure 1.
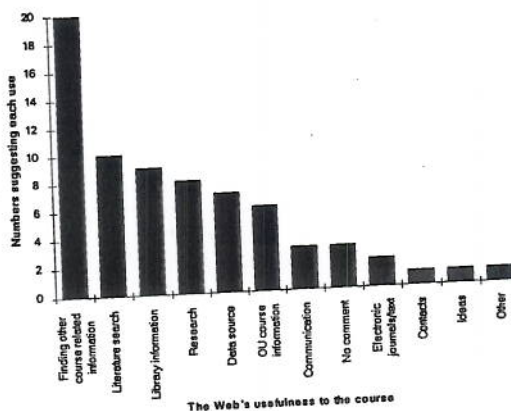

Figure 1 How the Web is seen as useful to teaching and learning in the OU context.

A more detailed analysis revealed that the 7 postgraduate Arts courses were more likely to use the Internet to access library catalogues or other online research resources and did not mention any

other usage. The Education course (also postgraduate), like the Arts courses, also used the Internet in modest ways, for example, the Web was used as a searchable resource with search engines. The main use of the Web for two courses in Science was high quality sites providing up to date information on Astronomy. Computing saw the Web as very useful for both access to libraries, the NISS gateway for BIDS and OCLC First Search, and for rapid updating of course materials. OBS and Technology were also interested in the Web as a library of resources but by contrast with Arts, Science and Computing had much more innovative uses of the Web including the need for students to network and make contacts. It must be remembered however that these two groups account for approximately half of the courses in our survey and individual courses tried different approaches. OBS directed their students to creativity related sites which included software, newspapers, interactive questionnaires, and audio visual demonstrations. Mason (1997), reporting on the students summer school experience on the Technology Foundation course (T102) found that "Libraries and the Internet/WWW were the two most frequently used additional resources". However the technology courses in our survey used the Web's resources as part of the course material by providing course outlines and expecting students to find the additional materials on the Web.

In order to carry out the activities expected by course teams the students were required to use certain of the Internet Tools provided. A variety of expectations about student usage emerged. Not surprisingly Netscape was the Internet Tool which 26 out of the 29 courses in our survey wanted their students to use, see Figure 2.
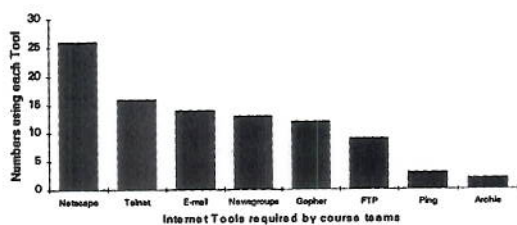

Figure 2 Internet Tools students were expected to use

Telnet and email were both used by over half of the courses; and just under half of the course teams required their students to use Newsgroups and Gopher. Some 9 courses wanted their students to use FTP. The Archie and Ping Tools were required exclusively by some Technology courses.

Course teams may be naive about the possibilities offered by the Internet. When establishing if course teams required any additional Internet Tools to help their students, we found that only three course teams made suggestions. One saying "none that I know of, I suppose things like Real Audio might help. Basically anything needed to make full use of all links on our Web site". Another course team suggested the "Adobe acrobat reader and other Netscape plug ins such as Real Audio". A third would like "emerging technologies such as Java, Shockwave, Activex, etc". These were interesting suggestions but what is probably more important is the fact that 26 course teams did not have an expectation of requiring new Internet Tools. This suggests that the use of these facilities is not being technology driven and that course teams are discovering how best to use the Internet Tools they already have at their disposal.

Internet issues identified at the OU

- In our questionnaire survey one of our main aims was to find out if the issues identified from the literature with respect to teaching and learning on the Internet apply to course usage at the OU.

Teaching and support structures

The Internet per se does not have the prominence that one would expect, to facilitate student to student, and student to tutor interaction in a teaching and learning environment. Indeed the Academic community has recently been discussing poor POP mail performance. Although there are problems, smaller population courses are able to make more active use of the Internet and one example of this at the OU is H801, the first course in the MA in Open and Distance Education. This course uses the Internet to access the International Centre for Distance Learning and resources as well as for the rest of the course presentation and electronic submission of assignments. They use the

Frontier Bulletin board and a POP mail account, rather than FirstClass. For this small population course the full adoption of the Internet probably works well.

However, because the OU supports large numbers of students, a proprietary conferencing system (FirstClass) was adopted as the main form of electronic communication between tutors and students. It is not perhaps surprising therefore that courses in our survey did not allude to the need for teaching and support structures for the Internet since these types of issues were more likely to be apparent in the FirstClass conferencing environment. An example of a project which has investigated supporting role requirements for computer conferencing was the M205- STILE project in the OU's Computing Department. A new role emerged, that of the Interactive Media Facilitator or IMF, see Wilson and Whitelock (1996) and Mason (1996).

There is a need to develop new teaching and support roles. One way of proceeding would be to adopt the role of an IMF in the Web facility. The IMF would reduce the confusion created by following one link after another without any guidance. This would encourage student usage, structure and support their learning activities, and encourage interaction in web conferencing environments. A guide is proposed which would assist travellers as this new terrain evolves.

Orientation and overload

The vast amount of resources on the Web can cause confusion for the novice. Course teams at the OU have tried to structure access to on-line materials through pages they have created which include links to the specific resources of interest, rather than leaving it to the students to roam freely. In our survey, some 69% of respondents reported that they produced specific Web pages for their students. These course teams were across the domains of Arts, Technology, Education and OBS.

The vast majority of our surveyed group, 79%, directed their students to Web pages other than those provided by the OU. Courses in both Technology and OBS mentioned encouraging their students to improve their information handling

skills. The undergraduate technology course T293 Communicating Technology uses the Web as a "major source of information for the part of the course associated with finding and using information". The OBS course B889 Performance Measurement saw the Internet as valuable to teaching "information acquisition skills" while "directing students to course specific sites of interest". A postgraduate Computing course, M801 MSc in Computers for Commerce and Industry, saw the Internet as "extremely useful in introducing students to the concept of literature searching of academic journals... The immense amount of information available quickly makes them realise they must focus their search on key topics".

Students need navigational instructions or tools and training in organisational skills.

Collaboration

The OU has taken teaching on-line to home based students very seriously. As a result of many projects making successful use of FirstClass, this software has been adopted wholeheartedly by course teams. FirstClass can support large numbers and the offline reader reduces telephone costs. The great advantages of this propriety conferencing and email software are the ease of use and stability it provides to enable collaboration, see Wilson and Whitelock, 1997a and c. Indications from researchers such as Bentley et al (1997) and Collis (1996) are that software applications are not yet available to allow this sort of collaboration to take place on the Internet in quite the same way. This perhaps explains why OU courses rely more heavily on a proprietary conferencing system to send email on the Internet rather than using systems such as Hypernews or Frontier. In 1997 the FirstClass conferencing system was used by up to 30,000 students. Of the courses we surveyed, 72% made use of FirstClass conferences in 1997. It could be said perhaps that the OU's adoption of the FirstClass system on such a scale has affected course team uptake of the Internet for interacting with other students and tutors. Indeed, approximately half the students using the FirstClass system have access to the Internet itself with a variety of software applications supplied by the ACS pack, see Table 1.

Not surprisingly, therefore, more creative uses of the Internet, such as networking and forming contacts, reading and exchanging ideas, communicating (with exchanging hypertext, email) were only suggested by a few courses teams in our survey. However one OBS course saw that the Internet in the future would be a "vital resource and eventual groupware/teaching" ... medium for "Web based world wide discussion groups".

There is a requirement for conferencing on the Web for large numbers of participants to help create a sense of community and facilitate collaboration.

Technical issues

Course teams from Technology expressed how their students experienced technical difficulties. T355 Manufacturing Technology reported that some students found setting up instructions difficult to follow. The installation process was reported as working well for most students but for those for whom it didn't work, going back through the installation instructions didn't help. T265 Renewable Energy were concerned about the technicalities of software use because "many of the students on this course have never used a computer before".

Even with the support provided by the Internet pack provided by ACS (see Table 1), Sumner and Taylor (1998) found that some of their developmental testing students for the M206 course "had experienced setbacks, e.g., a difficult installation or 'Web' session, that had shattered their confidence".

Materials supporting students' use of new technology need to be revised to minimise the technical difficulties users experience.

Cost considerations

Cost is a very big concern at the OU because of the knock on effect for students. Course teams worry about how accessible (ie the cost to the student) the Internet is and are afraid of alienating those who lack the resources to use it. Many courses reported optional rather than compulsory usage. For example two science courses were of the opinion that "compulsory use would open up many other possibilities but ... we cannot assume that all students have access to computers". Some mainstream courses in our survey tried to cut costs in the following ways.

One technology course T293 Communicating Technology reported using the Netscape browser to view material provided by the course team "in local mode and thus enable students to view hypertext material ..." off-line. They also facilitated their students creation of their own hypertext material which they could view off line. This off-line use of a browser was "actually... larger ... than WWW access!" Another Technology course reported that their use of the Web on at least one occasion saved about "20 pages of diagrams, while in others we give access to regularly updated information on quantitative data". M206 reported that "use of the web as a periodic delivery mechanism is consistent with the design goal of limiting the time students must spend on-line due to high telephone costs" (Sumner, and Taylor, 1998).

To save students money, T102 Living with Technology use the Internet optionally except at summer school, where the students use the Internet to access the Web and use FTP to send files around. Students who were not able to attend the traditional summer school were able to attend the T102 Virtual Summer School where students were not charged for attendance or telephone costs. However, one of the main aims "of the experiment was to find out what fee would have to be charged for a virtual summer school to be self-financing" (Lincoln, 1997).

The use of new technologies needs to be scalable both in terms of staff time and in allowing student participation with the lowest common denominator equipment.

Immediate information

One Computing course in our survey which used a POP mail account saw the Web as a method for "rapid exchange of information between OU students/tutors".

Courses in our survey in Science, Computing and Technology also mentioned the importance of the Web for course materials which need frequent updating and "hence avoiding reprints of units". Indeed M206 were keen to use the WWW to enable them to easily update the course by putting course material on the Web as well as in print. However, Sumner and Taylor (1998) realised that 'some students rarely visited the Web site since the materials there were redundant to their printed text'. As a result of their findings the course team now uses the Web "as a digital library for materials not available elsewhere, such as time-sensitive information and updates for all resource types".

The Web was also seen as a source of new information relevant to course materials by two Science courses "particularly ... for astronomy (S281) where there are many high quality sites providing up to date information". T265 Renewable Energy also explained how as a "new subject, it is difficult to get books on it in libraries. The students have to do a project and for some the WWW is the only way to find information not sent with the course materials..." "We send the students to Web resources which provide the full documentation for which we provide outlines in the course".

To maintain a sense of momentum students and tutors need to log on more frequently using an off-line reader for email and conference messages. Web pages need to be rapidly updated to maintain a sense of immediacy.

Discussion

* Some 59% of the courses we surveyed were at postgraduate level, this might explain why some course teams used the Internet as a means of conveying information about their actual courses because they expected students at this level to develop research skills. Course populations may also affect how the Internet is used and those in our survey ranged between 100 and 1,500.

Only three course teams showed an interest in Internet Tools other than those provided. These were the Acrobat Reader, Java, Shockwave, Activex, and Real Audio. These Tools may become more important in the future, particularly the Acrobat

Reader for reading on line journals. The fact that course teams were not requiring the latest technologies suggests that they are in control of the technology for teaching and learning rather than the activity being driven by the technology itself.

Conclusions

* More recent innovative work carried out at the OU deals with scalability issues and technology. Eisenstadt et al (1996) report that "KMi Stadium is a Java-implemented medium for hosting distributed events on a very large scale on the Internet... even over 28.8Kbps dial-up modems". It "makes available as a reusable resource audio, co-ordinated visuals, and secondary resources such as relevant documents, demonstrations and Web sites. The KMi Stadium, however was described as "a software prototype" in 1996 and is not yet being used in mainstream teaching.

The issues raised suggest a number of ways to proceed.

1. There is a need to develop new teaching and support roles. One way of proceeding would be to adopt the role of an IMF (see Wilson and Whitelock 1996) in the Web facility.

2. Students need navigational instructions or tools and training in organisational skills.

3. There is a requirement for conferencing on the Web for large numbers of participants to help create a sense of community and facilitate collaboration.

4. Materials supporting students' use of new technology need to be revised to minimise the technical difficulties users experience.

5. The use of new technologies needs to be scalable both in terms of staff time and in allowing student participation with the lowest common denominator equipment.

6. To maintain a sense of momentum students and tutors need to log on more frequently using an off-line reader for email

and conference messages. Web pages need to be rapidly updated to maintain a sense of immediacy.

The combination of Web access and CDrom for on and off-line working is discussed as a way forward by Langenbach & Bodendorf (1997). However one particular issue which remains on the Web is security and the need for better password and authentication (Thomas et al, 1996; Vetter and Kroeker 1998). This is an issue which will have to be resolved especially if the business community is going to take the Web more seriously than it does at present. Whitelock (1997) discusses watermarking technology which offers an exciting way forward with copyright and authenticity issues. Another factor is the Web's potential as a collaborative learning tool which is only just being realised by course teams but may take a few years to become fully realised.

Acknowledgements

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