Hijacking hypermedia

and other highways to learn computer science on a distance-learning course

Tina Wilson and Denise Whitelock

Institute of Educational Technology, Open University

Centres for higher education are seeking to adopt online systems to improve their course presentation. The investigation of how these facilities can be beneficial to teaching and learning is essential. STILE (Students' and Teachers' Integrated Learning Environment) is a project which involved four universities in the United Kingdom. The online facilities were provided in both campus and distance-learning situations. The system used was based on the World Wide Web. However, because the Web did not comfortably facilitate conferencing in 1995, at the Open University we also adopted a proprietary conferencing system. This paper describes not only how interested the students were in the extra material provided online in both the conferencing and Web environments, but also how beneficial they felt each medium was to their learning. The tutors' perceptions of their students' participation with these online facilities is also discussed.

Introduction

A teaching project using Computer-Mediated Communication (CMC) to aid students' understanding of computer science took place from February to November 1995 at the Open University. The project fell within that of STILE (Students' and Teachers' Integrated Learning Environment), and the course was M205 – STILE: Fundamentals of Computing. Four different institutions were involved: the Universities of Leicester, Loughborough, De Montfort and the Open University (Ruggles, 1995; Ruggles *et al*, 1995; Underwood *et al*, 1996; Zhao *et al*, 1996). One of the main aims of the Open University implementation was to improve the presentation of the computer science course by enabling structured access to online facilities for both tutor-to-student and student-to-student communication. The nine tutors and 110 computer science students were situated nationwide and in Europe. In line with our partners, we used the Netscape browser version 1 revision N, with Trumpet version 2 revision B. Although use of the Web for teaching and learning was underpinned by a wealth of literature about hypertext and hypermedia (see Nielsen 1993; Laurillard, 1994), it did not successfully sustain conferencing in 1995. Therefore we also adopted the FirstClass conferencing system (version 2.6) to accommodate our distance-learning students.

This paper discusses a second-stage evaluation of the project, following on from Wilson and Whitelock (1996). Here we compare student and tutor reactions to the World Wide Web presentation of the course (using Netscape) as contrasted with perceptions of the curriculum delivered via the FirstClass conferencing system. The provision of extra material enabled us to evaluate how interested the tutors and students were in the facilities provided, and which format they found more beneficial for their teaching and learning.

Results

A range of empirical findings are presented here, to address the following issues:

- interest in materials provided by FirstClass (Blocks 1 to 4);

- interest in materials provided by the Web (Block 5);

- how beneficial it was to have access to both FirstClass and Netscape;

- how the tutors rated the online course material and each medium with respect to the students' method of learning.

A number of evaluation techniques were used to access these issues, including monitoring online questionnaires completed during and after the tutors' and students' online experiences, student comments, and a questionnaire designed to probe the tutors' and students' perceptions of the learning experience with respect to the Web and conferencing presentations of the course material.

Student interest in the online material in FirstClass (Blocks I to 4)

In order to access how interested the students were in the computer science material provided in FirstClass, we asked the 58 students who remained online for the duration of the course how interested they were in using this extra material to help with their learning. The response rate was 84 per cent. See Figure 1.

The students were very interested in the extra exercises and answers provided in FirstClass, 73 per cent rating their interest in the material at 3 and above (range 1 to 5, 5 = very interested). In fact when these students were questioned on a separate occasion about how they used M205 - STILE, 17 per cent reported that one of their main reasons for using this system was to have access to the extra material provided.
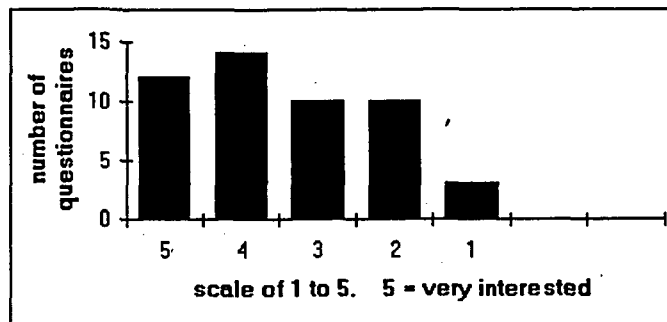

Figure 1: Student interest in the Blocks 1 to 4 FirstClass material to help their study of M205

Student interest in the online Web material (Block 5)

With the Web, one teaching block of material was provided online in August, when students had become more confident with using online facilities. Only 40 per cent of the total number of students used the Web materials. This uptake was not unexpected since the software and material was introduced quite late in the course. To gauge student perceived interest in the Block 5 Web pages, questionnaires were sent out to the 58 students who were online, and an 81 per cent response rate was obtained (see Figure 2). Student responses were mixed and fairly evenly spread through the range, but 53 per cent reported that they were interested in the Web material, rating their interest at 3 and above. However some students did not know if the material was helpful to their study of M205, and some reported that they did not access the Block 5 material on the Web. One student commented on the difficulties associated with navigating through Web resources. Indeed, the attractions of the Web could easily allow a student to become side-tracked, and this suggests that students need to learn new working practices to help them overcome the mass of data on the Web.

However, some students did appreciate the freedom to explore the course material via Netscape, and ventured outside the four university STILE sites to find something they were looking for. These points raise the issue of how much students should be guided in their use of the Web, and how much should be left to the own desire to adopt a discovery-learning approach. Such pedagogical and software design issues need to be addressed in future presentations of courses on the Web.
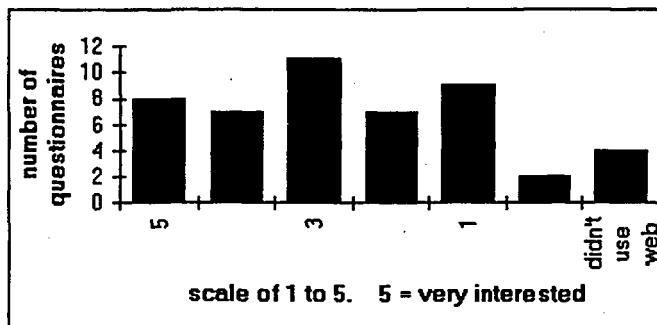
Figure 2: Student interest in the Block 5 Web pages to help their study of M205

Student perceptions of the benefits of access to both the Web and FirstClass
Students were asked if they found it beneficial to have access to both FirstClass and Netscape. Questionnaires were sent out to the 58 students who were still online. the response rate of 83 per cent. See Figure 3. The majority of students felt that it was beneficial to have used both FirstClass and the Web. The students who participated in this project were given two new media to assist with their course work. In general Open University students are keen to adopt a new medium. We must bear in mind therefore that answers to this question could be affected by the students' perception that a negative response could result in either one or both of these facilities being taken away. It must be said, however, that a high proportion did not know if it was beneficial to have access to both. Some students felt that FirstClass on its own was beneficial to their course work, while a significant number saw Netscape as an add-on which was of indirect use: 'Yes. FirstClass was excellent for course work and TMA [Tutor [Marked Assessment] problems. Netscape was good for looking at the world in general'.

One student commented on the difficulty of comparing the two media:

> I have had little experience of Netscape. Perhaps with a little practice I might find Netscape as useful as FirstClass! Yes, FirstClass was great because I had become comfortable with using it, but Netscape led me to explore the outside world.

This student mentions the importance of feeling comfortable with the electronic environment, and in the time allowed for comparison preferred FirstClass. Collis (1996) compares proprietary conferencing software and the facilities provided by the Web. She mentions the advantages of computer conferencing environments. From student reactions to the Web interface, when compared to FirstClass (see Wilson and Whitelock, 1997), we would surmize that it will be some time before the Web provides an environment as comfortable as FirstClass.
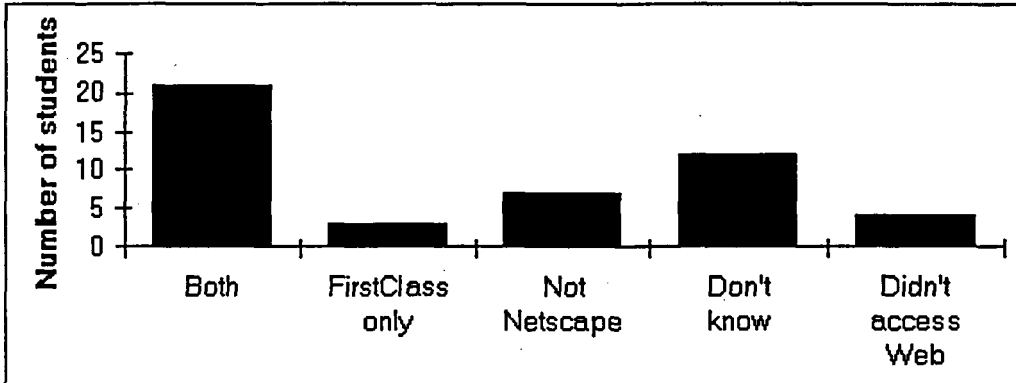

Figure 3: How beneficial it was found to have access to both FirstClass and Netscape

Tutor perceptions of the benefits of the Web and FirstClass to their students' learning

We asked the tutors to score between 1 and 5 (5 = very beneficial) how beneficial they felt FirstClass was to their students (see Figure 4). Six of the eight rated it highly in this respect.
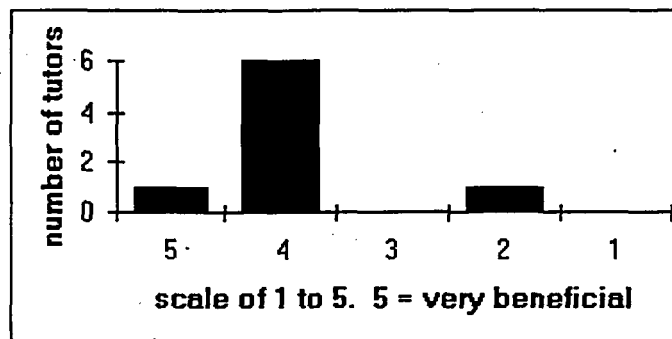

Figure 4: How beneficial tutors felt FirstClass was for their students

We also asked the tutors for their views on whether the online material needed to be modified to be more effective. Questionnaires were sent out online to the nine tutors at the end of the presentation. Eight responded. Their comments referred to the material in

FirstClass, and they did not comment on whether the Block 5 Web material could be modified (see below). Although the tutors used the conferencing facilities to negotiate the design and presentation of the online materials for FirstClass, the material chosen may not have worked as well as expected. They found it difficult to know how they could improve the type and presentation of these materials. Six were unable to suggest improvements, and one tutor's comment captures their thoughts:

> I have no strong views on this. I am sure there is always room for improvement, but whether the increase in effectiveness would justify the effort I can't say.

The other two tutors who responded were not convinced that the exercises and answers presented in the FirstClass environment were helpful. As one tutor put it; 'the online material presented was more of the same rather than anything new and exciting'.

We then asked the tutors to score between 1 and 5 how beneficial they felt the Web was to their students (see Figure 5).
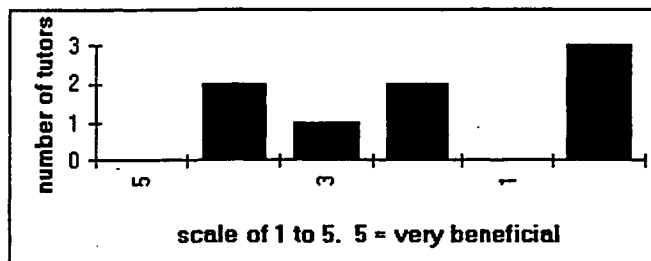

Figure 5: How beneficial tutors felt the Web was for their students

Five felt that the Web may have been beneficial, and three did not know. This was probably more due to the fact that they themselves did not have time to explore the Web fully (see Wilson and Whitelock, 1997).

Discussion

The Web conferencing facilities were limited in 1995, and we had to advocate the use of two systems for M205 - STILE, one for conferencing and email and one for Web access. It has been suggested, however, that the Web even in 1997 is still not a very good medium for conferencing: Collis (1996) discusses the benefits of computer conferencing as compared to the Web environment for course organisation; hypertext systems, proprietary conferencing systems and the Web are discussed by Laurillard (1994), Naidu *et al* (1995), Cohen (1996) and Nkambou and Gauthier (1996).

The tutors involved in M205 – STILE were able to attain a level of experience with FirstClass before the students came online. This enabled them to help and encourage the students to use the system. However, because of the time constraints which meant that the tutors did not have a comparable amount of time to become familiar with the Web-based facilities before the students started to use them, they could not influence their students to use it more. We would recommend in future that the tutors are taught how to use the Web first and given time to become familiar with the system and the culture before the students come online. Nevertheless, the tutors were more aware of the pedagogical advantages of FirstClass as a discursive medium as compared to the Web facility which did not provide a conferencing forum.

The students found that it was not the lack of pedagogy in the materials that was a problem but the lack of an integrated system (with one interface). One student commented:

> I found that FirstClass was more beneficial. If someone posted any material it was easier to reply to, without having to remember his address, enter FirstClass and then prepare a message.

He found it easier to use FirstClass for all his activities rather than using the Web and then having to use FirstClass. In a sense this mirrored what the tutors believed about the advantages of FirstClass as a discursive medium, and it also explains why the tutors rated FirstClass highly beneficial to their students' learning while some did not know if the Web was beneficial at all.

The tutors could not suggest how the FirstClass online material could be improved except by the introduction of a compulsory element where students would be marked for their participation. This point is discussed by Mason (1994). Perhaps if participation was made compulsory, assessed and made part of normal study with the Open University, it would become part of the accepted culture. One student who would like to have tried electronic submission of TMAs suggested that the facilities would need to be improved and be easy to use to enable students to submit electronic assignments: 'It seems very feasible that TMAs could be transmitted electronically, however I think you may have to provide students with suitable tools.' In the case of the online Web material, the tutors did not know enough about the Web to comment on how it could be improved.

Our findings suggest that with new media students need to be taught different working practices and be given easy-to-use tools and guidance to achieve their aims. This is especially true of information on the Web which is not always thoroughly vetted and can result in a maze of information of dubious quality. Since the start of 1995, technology has moved forward in both the FirstClass and Web environments, and it will be possible to integrate these two systems more easily in the future; for example conferences in FirstClass are already being replicated on the Web. The pedagogical benefits of audio on the Web and voice mail in FirstClass need further investigation. Although the technologies are converging, at this preliminary design stage of our Web environment we see the adoption of an Interactive Media Facilitator (or IMF, see Wilson and Whitelock, 1996) as crucial to the future development of this culture for teaching and learning.

Acknowledgements

References

Collis, B. (1996), *Tele-learning in a Digital World. The Future of Distance Learning*, London: International Thomson Computer Press.

Cohen L. V. (1996), 'The effect of technology on student learning' in Carlson, P. and Makedon, F. (eds), *Proceedings of ED-Media 1996*, Boston MA: AACE.

Laurillard, D. (1994), *Rethinking University Teaching*, London: Routledge.

Mason, R. (1994), *Using Communications Media in Open and Flexible Learning*, London: Kogan Page.

Naidu, S., Barrett, J. and Olsen, P. (1995). 'Improving instructional effectiveness with computer mediated communication', *Association for Learning Technology Journal*, 3 (2).

Nielsen, J. (1993), *Hypertext and Hypermedia*, London: Academic Press.

Nkambou, R. and Gauthier, G. (1996), 'Use of WWW resources by an Intelligent Tutoring System' in Carlson, P. and Makedon, F. (eds), *Proceedings of ED-Media 1996*, Boston MA: AACE.

Ruggles, C., Underwood, J. and Walker, D. (1995), 'STILE: a hypermedia approach to the provision of a flexible, interdisciplinary resource base for teaching and learning', *Innovations in Education and Training International*, 32 (3).

Ruggles, C. (1995), 'STILE: the growth of a flexible, interdisciplinary resource base for open learning' in Tinsley, J.D. and van Weert, T.J. (eds), *Liberating the Learner. World Conference on Computers in Education VI: WCCE95*, London: Chapman and Hall, 899–906.

Underwood, J., Dahlberg, A., FitzPatrick, S. and Greenwood, M. (1996), 'A STILE project case study: the evaluation of a computer-based visual key for fossil identification, *Association for learning Technology Journal*, 4 (2).

Wilson, T. and Whitelock, D. (1995), 'Too much too soon? The pros and cons of using new technology in the presentation of a distance learning computer science course' in *Digest on Information Overload*, Digest No: 95/223, London: IEE Computing and Control Division.

Wilson, T. and Whitelock, D.(1996), 'Piloting a new approach: making use of new technology to present a distance-learning computer science course', *Association for Learning Technology Journal*, 4 (1).

Wilson, T. and Whitelock, D. (1997), 'Opening up horizons: providing online course material in cyberspace' in Travis, D. (ed), special issue of *Displays in Multimedia* (in press).

Zhao, Z., Cook, J and Higgen, N. (1996)., 'Online learning for design students', *Association for Learning Technology* Journal, 4 (1).