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Investigating design features of a computer-mediated communication system

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Investigating design features of a computer-mediated communication system

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Abstract

Computer-mediated communication (CMC) is increasingly used in higher education, but it is not without problems. The effectiveness of CMC depends on many factors, including the characteristics of CMC systems themselves. The research reported here therefore aimed to investigate how an educational CMC system might be improved, in order to support learning more effectively.

The main context for the research was distance learning at the UK Open University (OU). A two-stage, mixed methods research approach was adopted. In the first stage, interviews and observations were carried out to explore the benefits and problems experienced by users. This revealed two major issues: information overload and lack of social presence. Information overload relates to users' problems dealing with large numbers of messages. Social presence relates to the need for users to feel connected with each other.

The second stage investigated system features aimed at addressing these issues, implemented in a prototype computer conferencing system. Features to address overload included branched message threading and user recommendations. Features to address social presence were 'résumés' and instant messaging. These features were evaluated using questionnaires, with several cohorts of students in an OU course.

Students expressed approval of the features, although some features were not widely used. Students preferred branched threading to chronological

threading because branching helped them to follow 'conversations'. Students were uncomfortable recommending messages, feeling that the value of a message would vary between people. They were also uncomfortable using instant messaging to contact others whom they did not know. However, the awareness aspect of instant messaging provided a sense of solidarity.

The research demonstrated that the problems of overload and lack of social presence are significant, and each has social aspects which must be addressed. Students' relationships with each other affect whether and how they use the features of CMC systems. We can conclude that particular attention must be paid to the social aspects of online communication, both when designing educational CMC systems and when considering how they are used. To maximise the benefits for learning, students need to feel comfortable with each other online, and there are few short cuts to achieving this.

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Contents

Chapter 1

Introduction

1. Learning with technology

New approaches to learning and teaching are changing the experience of students in higher education. In these approaches, learners are active; they learn by working with each other and communicating with each other. These approaches to learning are often described as 'constructivist':

> 'The constructivist theory holds that knowledge has to be discovered, constructed, practiced and validated by each learner' (Benbunan-Fich et al., 2005, p. 20)

In parallel with new ideas about learning, there has been a rapid adoption of information and communication technologies in education. In particular, the prevalence of the internet and web has led to an increasing interest in online learning or e-learning.

The use of technology for learning has a particularly strong impact in the distance education sector. Distance learners have previously studied largely in isolation, with occasional face-to-face meetings, but communication technology can fundamentally change this learning and teaching model. Students can keep in regular contact with their teachers and peers through communication technologies, and can have access to a wide range of resources via the internet. Face-to-face institutions are also noting the benefits of communication technologies, which provide flexible learning

settings for students who may have part-time jobs or live away from the campus.

The challenge, whether for distance learning institutions or face-to-face institutions, is to select and use technology so that it best supports learning. This means using ideas about learning, together with knowledge of technology, to create imaginative and practical systems which fulfil the needs of learners and educators.

2. Computer-mediated communication in education

Constructivist approaches to learning involve interaction and dialogue. This interaction is not simply the one-way transmission of information from teacher to student. It is exploring ideas with other people, asking and answering questions, and solving problems with others. When students meet with their teachers and peers, there are many opportunities for learning through communication and interaction, but it is not always easy for students to meet face-to-face, particularly in a distance learning context. An alternative is to meet 'virtually' using communication technology; this is often described as computer-mediated communication (CMC). Computer-mediated communication may be synchronous, where all participants are online together, or asynchronous, where messages are posted and then read by others later.

There are many benefits from the use of CMC as part of a course of study. CMC enables collaborative learning activities to be carried out even when students cannot meet face-to-face. Synchronous CMC addresses limitations

due to distance: students in different locations can communicate via computers and networks. Asynchronous CMC addresses limitations due to both distance and time: students can communicate even if they are not in the same place or available at the same time. Students can use both synchronous and asynchronous CMC systems to share ideas and to support each other. Teachers can be in more regular and convenient contact with their students and can distribute learning resources electronically.

However, there are also problems when using CMC systems in education. One problem is that users can feel overwhelmed and confused. This is a particular issue in asynchronous discussion systems, where there may be large numbers of messages to read. A further problem is that computer-mediated communication can seem impersonal. Again, this is a particular problem in asynchronous communication, where there are time lags between messages. These issues, and others, can result in low participation by students, and hence less effective learning.

3. Systems for computer-mediated communication

Many different systems can be used for computer-mediated communication in education. For asynchronous communication, a simple email list allows a group of students to contact each other. Alternatively, the Internet supports a broad range of web forums, as well as the more long-standing 'newsgroups'. For synchronous communication there are text-based chat tools, instant messaging, and audio- and video-conferencing systems. Computer conferencing systems are more specialist tools designed to support group

communication, primarily via asynchronous discussion, but also encompassing synchronous communication. A number of institutions have created their own online learning environments which can integrate delivery of teaching materials with facilities for asynchronous and synchronous discussion and for collaborative work (Harasim, 1999; Hiltz, 1994). In recent years Virtual Learning Environments (VLEs) such as Blackboard, WebCT and Moodle have become widely available, and many universities are using these systems with their students (Browne et al., 2006; Salmon, 2005; Weller, 2007). VLEs typically include asynchronous discussion forums and synchronous chat tools (as well other facilities for online course delivery and assessment). They may also provide further communication tools such as wikis and blogs.

Educational institutions and their staff are therefore faced with a range of possibilities for computer-mediated communication. On what basis are they to choose or build suitable systems? Which features and characteristics of a system will support the learning process, and which might inhibit it? The educational literature has surprisingly little to say on this issue. There is a tendency for practitioners to use whatever tools are convenient and available, and to assume that learners will adapt to them. Using easily available tools is a sensible approach, and it is certainly true that learners adapt, but they may also be limited by the systems that are provided. With better systems they might learn more effectively or easily, and gain more enjoyment from the process.

4. Focus of the research

The research reported here addresses the question of what makes a good CMC system for use in higher education. The research is based on the premise that characteristics of the CMC system will affect students' interactions with each other and hence their experience of learning. Similarly, system characteristics will affect the work of teachers in supporting their students. If steps can be taken towards designing better educational CMC systems, this should have a positive influence on a range of learning outcomes. Students might participate more in online communication, they might feel an enhanced sense of community and they might gain in knowledge and confidence. All these factors contribute, in a broad sense, to learning.

The research therefore aimed to investigate how a system for computer-mediated communication might be improved, in order to provide better support for learners and teachers. To address this issue, a two-stage research approach was adopted. The first stage aimed to elicit the views and ideas of users of educational CMC systems. This stage focused on: the FirstClass computer conferencing system, which is used by the UK Open University; and a number of different virtual learning environments, used by other UK universities. The data from this stage was used to formulate hypotheses about how a CMC system could be improved. A second research stage then investigated these hypotheses by means of a field study with students, using a prototype computer conferencing system.

5. Research questions

The primary focus of the research was to investigate how a CMC system might be improved. In order to do this it was necessary to establish which aspects of current CMC systems were beneficial and which were problematic. A preliminary objective of the research was therefore to elaborate the benefits and problems of using CMC systems, from the point of view of learners and teachers. This objective can be characterised by the following research question:

What benefits and problems do learners and teachers experience when using computer-mediated communication systems within the context of a university course?

Having carried out investigations to address the question above, the research could then focus on the main objective of investigating whether a CMC system could be improved to increase the benefits and reduce the problems. This objective can be characterised by the following research question:

To what extent can benefits to learners and teachers be increased, and problems reduced, by changes to the design of a CMC system?

The aim here was not to address all the potential benefits and problems, but to focus on aspects which emerged as particularly significant for learners in higher education. These aspects are discussed below.

6. Research context and approach

The context of this research was the use of CMC for university study. The majority of the research was carried out with distance learners studying courses in technology at the UK Open University (OU). In order to gain the perspectives of teachers as well as learners, OU tutors (part-time members of staff who each support a group of students) were also included as participants in the research. To broaden the context beyond Open University courses, teaching staff at other UK universities were also included.

The research was undertaken in two stages. In the first stage, interviews and observations were carried out with OU students, OU tutors, and teachers at other universities who used CMC in their courses. The aims were: to identify the benefits and problems experienced by users (in distance education and as part of face-to-face courses); to discover which CMC features users found helpful and unhelpful; and to elicit ideas for improvements to educational CMC systems. This stage of the research is reported in Chapter 3 'User interviews and observations'.

The findings of this first stage of the research highlighted two major themes:

- information overload;

- social presence.

Information overload relates to problems learners (and to a lesser extent, teachers) have when dealing with large numbers of messages in asynchronous CMC systems. Users can experience difficulties and confusion in navigating through the store of messages and the different

discussion areas (Hiltz & Turoff, 1985). There are problems in finding useful information among the messages, and the process can be very time-consuming. Learners may judge that their time could be better spent in other ways, and may decide not to participate in CMC (Paloff & Pratt, 1999, p. 50).

Social presence relates to whether learners feel that they are interacting with real people when they read and write messages (Gunawardena & Zittle, 1997). This is closely connected to the development of a sense of community (Haythornthwaite et al., 2000). Because of the lack of body language, and the delays between messages, some users find text-based, asynchronous communication impersonal, and this can make them less willing to participate in online learning (Wegerif, 1998).

The second stage of the research investigated a number of system features aimed at addressing these issues. An opportunity arose to use a prototype web-based computer conferencing system as a test-bed in a new OU course. New features implemented in the prototype system were evaluated with students, primarily via questionnaires. The context of the evaluation was a 12 week, 100-hour OU course: TT380 *Databases within web site design*. The prototype conferencing system was used as a case study and as the main communication tool on this course.

To investigate the problem of overload, students of TT380 used two versions of the prototype conferencing system: one which included a number of features aimed at alleviating overload; and one which did not

include these features. The features were: branched threading of messages (as opposed to chronological threading); user recommendation of messages; filtering of messages using different criteria; and a 'clipping' facility for keeping a personal record of selected messages. An investigation of students' use and perceptions of these features was undertaken, and is reported in Chapter 4 'Prototyping to address overload'.

To investigate the issue of social presence, the prototype conferencing system was used to evaluate two features aimed at increasing students' sense of connection with each other. These features were: 'résumés', where users could post information about themselves; and an instant messaging facility, which showed who else was online, and enabled synchronous one-to-one communication. This part of the research is reported in Chapter 5 'Prototyping to enhance social presence'.

7. Scope of the research

There are many technological and educational factors which can influence the effectiveness of educational CMC (Arbaugh and Benunan-Fich, 2005). For example, the pedagogical approach, the course assessment and the availability of equipment and connectivity for students will all play an important role. However the research presented here focuses specifically on the CMC systems themselves. These include: computer conferencing systems; web-based discussion environments; and virtual learning environments (VLEs), which provide communication tools such as discussion forums and synchronous chat. The characteristics and features of these systems will have an influence on the effectiveness of CMC, and its

value for learners and teachers. The research presented here aimed to investigate this aspect.

The research was largely within the context of distance learning at the UK Open University, and the majority of the research participants were OU students. Clearly this will affect the generality of the research findings. However, given the increasing prevalence of VLEs and online learning in higher education generally, it is anticipated that the research will be relevant beyond the distance learning context.

The second stage of the research (investigating new CMC features) was carried out as part of an operational distance learning course. This provided an authentic context for the investigation, but also meant that the research was subject to many constraints. At all times, it was necessary to give priority to students' learning activities rather than their participation in the research. Moreover, the research activities were carried out within the day-by-day realities and problems of ongoing course presentation. The author of this thesis was not a member of the course presentation team, so needed to adjust to any resulting difficulties, rather than being in a position to anticipate or prevent them.

The research was also framed by the use of a prototype web-based computer conferencing system. This system was developed and implemented by a member of the course team, and not by the author of this thesis. However the author was involved in the specification of the system, and in decisions about system features. The prototype conferencing system was used for

several purposes: as a test-bed for evaluating new system features; as the main communication system for the course; and as a case-study for teaching purposes. As such, the focus for the system implementation was on functionality and reliability rather than on detailed user-interface design or graphic design.

8. Overview of the thesis

The structure of the thesis is described in the following paragraphs.

This chapter (Chapter 1) has introduced the background to the research, and the reasons why such research is needed. It has also presented the research questions and outlined the approach adopted for addressing them.

Chapter 2 presents a literature survey relevant to the research questions and research methods. The chapter begins by positioning the use of CMC within the literature on learning, with reference to specific theories of learning. It goes on to discuss the benefits of CMC for higher education, and the problems which can arise in practice. The chapter then discusses research which has specifically focused on aspects of CMC systems. The chapter goes on to give an overview of research methods which can be used to investigate aspects of educational CMC systems. These methods are drawn from two discipline areas: educational research; and methods for system design. Finally, the methods chosen for the two stages of the research are presented.

Chapter 3 covers the first stage of the research, which elicited users' views of the benefits and problems of CMC, and their ideas for improvements to

systems. The chapter presents the findings of interviews and observations carried out with OU students, OU tutors, and teachers at other universities who use CMC in their courses. For each user group, the chapter presents the data from interviews and observations, describes how it was analysed, and discusses the issues which emerged. Two main themes are identified which were common to all three user groups. These are: the problem of information overload; and the need to enhance social presence.

Chapter 4 presents the findings of a prototyping study to address the problem of information overload. The chapter begins by introducing the course context and the web-based prototype conferencing system which was used for the research. The chapter describes and explains the set of system features which were aimed at alleviating overload. The survey-based method for the evaluation of these features is then described, and the main results are presented, with details given in appendices. The findings are then discussed, with comments on each of the system features under investigation. The chapter concludes with a summary of the outcomes of the investigation and some comments on the research methods.

Chapter 5 presents the findings of a second prototyping study which evaluated features designed to enhance social presence. These features were résumés and instant messaging. The chapter explains the rationale for these features, and the method by which they were evaluated. Again, the evaluation was survey-based, but this time including more qualitative data. The results of the evaluation are presented in the chapter, with details given

in appendices, as before. The conclusion to the chapter summarises the findings and relates them to the course context.

Chapter 6 brings together, and discusses, the findings of the research. It considers whether the research questions have been addressed, the benefits and limitations of the research approach and avenues for future research. Finally, it comments on the contribution made by the research to the field of educational computer-mediated communication.

Chapter 2

Literature survey and methodological review

1. Introduction

This chapter presents:

- a survey of relevant literature about educational CMC and CMC systems (Sections 2 to 8);

- a review of methods used for research in this field, together with a discussion of the methods selected for the present research (Sections 9 to 11).

The chapter begins by considering CMC in relation to theories of learning (Section 2). It then reviews the reported benefits and problems of CMC in education (Sections 3 and 4). The chapter continues by discussing research findings related to social, temporal and structural aspects of educational CMC (Sections 5 to 7). This is followed by a discussion of research focused specifically on educational CMC systems (Section 8).

The chapter then moves on to review relevant research methods. Methods used for gathering and analysing educational research data are considered, together with issues of reliability and validity (Section 9). Methods specifically used in system design are then discussed (Section 10). The chapter ends by explaining the methods chosen for the present research (Section 11).

2. Computer-mediated communication and learning

Computer-mediated communication (CMC) has been practised and researched in education for many years. For example, the edited collections of Mason and Kaye (1989) and Harasim (1990) reported on the work of educators and researchers in this field. Hiltz (1994) used the concept of the 'virtual classroom' to characterise a software-based learning environment which could be a replacement for a bricks-and-mortar learning space.

These ideas were based in part on the use of computer-mediated communication in non-educational contexts. For example, Hiltz and Turoff (1978) explored how CMC might be used for the benefit of organisations and society in general. Sproull and Keisler (1991) focused on CMC in an organisational setting. Rheingold (1993) discussed the use of CMC for building 'virtual communities' spanning distance and time. Rapaport (1991) described a range of online tools for supporting the work and conversations of groups of people.

The use of CMC in educational contexts was grounded also on the concept of collaborative learning, which Kaye (1992, p. 4) defined as

'individual learning as a result of group process'.

Collaborative learning approaches are themselves based on 'social constructivist' theories of learning. These theories arose from the work of researchers such as Vygotsky and Bruner (e.g. Vygotsky, 1962, 1978; Bruner, 1975, 1984) which emphasised social contexts and the role of

language. Constructivist theories of learning stress its active nature, whereby learners are seen as constructing knowledge through the activities they carry out:

> 'Constructivism comprises a family of theories but all have in common the centrality of the learner's activities in creating meaning' (Biggs, 1996, p. 347).

Constructivism can be contrasted with the more traditional objectivist or acquisitive learning theories. Here learning is seen as a process of transmission of knowledge from the teacher to the learner. According to Jonassen et al. (1995, p. 10), the objectivist model:

> 'assumes that the world is structured, that structure can be modelled and mapped onto the learner, and that the goal of the learner is to "mirror" reality as interpreted by the instructor.'

Some educators have strongly advocated constructivist approaches. Brown, Collins and Duguid (1989) argued that:

> 'knowledge is situated, being in part a product of the activity, context and culture in which it is developed and used.' (p. 32).

The viewpoint presented by Brown et al. is that learning cannot be abstracted from its context. The physical and social setting for learning therefore becomes all-important, and learning is seen as a process of enculturation which takes place through social interaction and authentic activities.

Brown et al.'s paper points forward to Lave and Wenger's (1991) work, where learning is seen as increasing participation in a community. Lave and Wenger emphasise that novices start their learning process by observing others, and then gradually become more active in the community. Wenger (1998) takes the idea of community further and claims that learning is a process of developing an identity as a member of a community of practice. Through taking part in the activities and practices of the community, members learn and change:

> 'Such learning has to do with the development of our practices and our ability to negotiate meaning. It is not just the acquisition of memories, habits and skills, but the formation of an identity.'
> (Wenger, 1998, p. 96)

It is clear that ideas of learning through interacting with others have been highly influential. This is particularly so in relation to the use of computers for learning. Laurillard's (1993) 'conversational framework' is an example of how ideas of dialogue and interaction can be applied to educational technology. In Laurillard's framework, a dialogue can be between the learner and the teacher, between the learner and other learners, or between the learner and his or her self (reflection). Computer-mediated communication can enable, or encourage, all of these kinds of dialogue. In particular, Garrison (1997, p. 3) claimed that computer conferencing:

'is a technology that has the potential to support learners in collaboratively constructing meaning and confirming understanding.'

3. Benefits of CMC in education

Many educators and researchers have reported on the benefits of CMC in education. For example, Hiltz and Turoff (1993, p. 471) claim that

'CMC is the ideal technology for extending the ability of students to discuss material and to work in collaborative groups as an integral part of the learning process. It is also the ideal technology for extending education or training to segments of the population who have difficulty in taking the time to attend face to face sessions.'

The above quotation illustrates the different kind of benefits which CMC is seen to provide:

- improvements to learning through dialogue and collaborative activities;

- improved access to learning by overcoming distance and time limitations.

Support for dialogue and discussion has been highlighted as a key benefit of CMC in education:

'Out of this stew of debate, learners can develop their own outlook on the subject and make their own meanings. But they will not have done

so without being exposed to other people's thoughts and feelings.'

(Rowntree, 1995, p. 208).

CMC is particularly beneficial in a distance learning context, where it can help to keep students in touch with their tutors and with fellow students. For example, Wilson and Whitelock (1998) investigated the use of CMC to support distance learners, and found that many students valued this means of contact. Students felt that the ability to ask fellow learners questions, to answer others' questions, or simply to observe the dialogue, were helpful for learning. The tutors consulted in this study also identified a number of benefits, for example the asynchronous (time-independent) nature of the medium.

The practical benefits of asynchronous CMC were highlighted by Henri (1995, p. 146) as follows:

'even people who have different work schedules or who are available at different times can communicate easily: all messages are kept in the memory of the server computer, which members can access at their convenience.'

She also went on to consider the educational and social benefits (p. 146):

'CMC has the added advantage of giving users the time to analyse statements, and sets up a dynamic situation wherein participation does not depend on the ability to make oneself heard.'

Research by Vonderwell (2003) also investigated the use of asynchronous CMC. Students commented that they felt more comfortable asking the teacher questions online than they would in a face-to-face class. As a result, they asked more questions, and were less embarrassed about what other students would think of them. Students also highlighted the benefit of an asynchronous medium for reflecting on ideas and for self-expression.

Browne (2003) reported on experiences from an online Masters degree, using the *Lotus Notes* system. Teaching staff on the programme reported that the quality of discussion and work from students was extremely high. Both staff and students commented on the value of having time to reflect on others' contributions and hence give more considered responses. The sense of community among students and staff was also found to be high, and students reported enjoying the online interactions.

Coppola et al (2002), who interviewed 20 online teachers, found that staff had a closer relationship with their students online than face-to-face:

> 'In spite of the lack of nonverbal expression, faculty found that their relationship with the students online was more intimate, more connected.' (p. 179).

In this study, staff reported that communication was improved generally. This was in part because of the convenience and efficiency of group-based asynchronous interaction. It was also because, in line with Vonderwell's (2003) findings, online communication seemed less public to students than

face-to-face communication. This meant that shy students had an opportunity to contribute.

McConnell (2006) argued that the use of CMC in a social constructivist framework can provide very positive outcomes for students. He based these conclusions on experience, over many years, of an online Masters course. The course placed a strong emphasis on collaborative learning and online community. Questionnaires to students demonstrated that they valued the approach and benefited from the online discussions. McConnell concluded (p. 89):

> 'The results are extremely encouraging, showing that when e-learning courses are designed with some care and attention to the meaning of learning in groups and communities, students' experiences can be very positive.'

4. Problems with CMC in education

The previous section discussed the benefits of CMC for education, as reported by practitioners and researchers in this field. These benefits are considerable, so it is clear that CMC can be an important tool for students and teachers. However, it is significant that all the researchers whose work was referred to in Section 3 have identified problems as well as benefits (see below). These problems can counteract the benefits in quite serious ways.

Hiltz and Turoff (1993), who highlighted the benefits of CMC for discussion, also pointed out that:

'At some size the benefit of increased communications becomes

the problem of information overload.' (p. 479)

They explained that attempts to operate the 'virtual classroom' environment

with over 90 students resulted in severe problems of overload, so that it was

necessary to break students into smaller groupings. They added (p. 479):

'A future need is to develop software to further structure

communication for very large classes, which would automate

more of the housekeeping functions and put more of the burden of

organisation and grading on the computer, rather than on the

human tutor.'

Rowntree (1995) pointed out problems arising from the textual nature of

CMC:

'It lacks the visual and auditory cues on which we usually rely in

interpreting other people's meanings (and their responses to what

we have said).' (p. 210)

He discussed how this can have a negative affect on students, particularly

those new to CMC. In an evaluation of the course Rowntree was discussing,

Wegerif (1998) reported the view of one student that:

"It is a cold medium. Unlike face to face communication you get

no instant feedback. You don't know how people responded to

your comments; they just go out into silence. This feels isolating

and unnerving. It is not warm and supportive."

This comment highlights problems with the asynchronous aspect of CMC. Asynchronous systems can be frustrating because of the time lag between sending a message and getting a reply (Bonk et al., 2001). This time lag makes decision-making particularly difficult (Sproull & Keisler, 1991 p. 69).

Wilson and Whitelock (1998) highlighted a further issue with asynchronous CMC: students' expectations of how quickly they would gain a response from their tutor. This study also found that students were less willing to engage with each other than with the tutor. In one tutorial group, students directed their messages only to the tutor; and even in the most active group, half the messages were posted by the tutor.

Henri (1995) also found that genuine interaction between students was lacking in the context she studied. Her analysis used 'communicogram' diagrams to illustrate the relationships between messages. The analysis found that only a third of the messages posted were 'interactive' i.e. related to one or more earlier messages. Moreover, where there was interaction it was highly dependent on the interventions of facilitators:

> 'the analysis of the teleconferences did not indicate that the learners participated collectively in the (re)construction of knowledge, as the majority of the messages were independent. The communicograms show us the learners' messages as a mosaic, held together by animateurs and experts.' (pp. 158-159)

Vonderwell's (2003) study identified similar problems with students not engaging each other in dialogue. This seemed to be because students did not feel that they knew each other, and felt uncomfortable making contact. Those who did attempt to communicate with their peers were discouraged by the lack of response. In line with Wegerif's (1998) findings, the students felt that the online environment was impersonal. One student commented:

"It is not like a person to person interaction. It's more like computer to computer interaction." (pp. 83-84)

Browne's (2003) study identified problems with lack of participation from some students. There were also technical problems initially, and some students found the conferencing environment complicated and frustrating to use. Concerns were also expressed by both students and staff as to the amount of time and effort demanded.

The online teachers interviewed by Coppola et al. (2002) also mentioned the large amount of time they needed to spend online. They said that there was additional managerial work needed to plan and run an online course, particularly in getting students started in the conferences. The 'friction of communication' was mentioned as a problem: teachers needed to spend time typing a reply to a student's query, rather than just providing an immediate response, as they could face-to-face.

McConnell (2006) reported problems related to dealing with large, complex bodies of textual discussion. From the findings of questionnaires to students (p. 66) it was clear that some students found it difficult to follow the

threaded discussions, particularly when working in large communities rather than smaller groups. The author pointed out that:

> 'the information flow is often too much to handle, and the speed at which the discussion threads develop, with members opening new threads in order to organize their ideas and invite others to discuss them, is extremely difficult to manage and navigate.' (p. 73)

McConnell also reported problems related to the interpersonal aspects of online communication. Students sometimes felt isolated, dominated by other participants, or anxious about presenting their ideas publicly (p. 69-70).

The preceding paragraphs have presented problems identified by the researchers who were reviewed in Section 3 'Benefits of CMC'. Other researchers and practitioners have also identified problems, as discussed below.

Murphy et al. (2001) drew together a collection of case studies where university teachers who were early adopters of CMC discussed their practice and experiences. A major concern raised in these case studies was a lack of participation and interactivity among students. Typical scenarios involved innovative teachers setting up discussion environments, and then finding that very few students used them (e.g. Wallace, 2001; Gunawardena et al., 2001).

In their accounts, the teachers suggested possible reasons for students' lack of engagement. For example:

'For highly motivated and self-directed learners who juggle online course with several other competing duties and demands, the discussion group may not have been enough return for their time investment.' (Gunawardena et al. 2001, p. 41).

Other issues were largely to do with social aspects of asynchronous CMC, arising from its lack of immediacy and of non-verbal cues (Robertshaw, 2001, p. 19). Some students perceived the medium as 'faceless' (Tarbin & Trevitt, 2001, p. 65) and impersonal. Misunderstandings could arise (Robertshaw, 2001, p. 14) and certain students could dominate the discussions (Fox, 2001, p. 59). The tone could become unpleasant, negative and even aggressive (Boshier, 2001; McLoughlin & Luca, 2001). In the extreme, these aspects could contribute to a 'flame war' among students (Robertshaw, 2001). Problems of this kind were off-putting to students, particularly if they were new to CMC. Tarbin and Trevitt (2001, p.70) found that it was particularly difficult to persuade first year students to take part in online discussions:

'This led us to hypothesise that first year students are reluctant to engage directly with the ideas or arguments of others for fear of appearing critical or being 'attacked' in return.'

Drawing together the findings from these case studies, it appears that the problem of low participation in CMC may partly be because students are anxious about exposing their ideas in a public and permanent way. This seems to conflict with the findings of Vonderwell (2003) and Coppolla

(2002), given in Section 3, that students felt more comfortable contributing online than face-to-face. However, the conclusion that many students experience anxiety, and can be overwhelmed by the quantity and quality of others' messages, is confirmed by other researchers (e.g. Mason and Bacsich, 1998). Possibly some students find online learning contexts more stressful than face-to-face ones, while others find the opposite.

As a conclusion to this section, we note that Harasim et al. (1995) devoted a chapter (pp. 219-237) of their book 'Learning Networks' to discussing problems which can arise when using CMC for learning. The main problems they discussed are summarised below.

- Technical problems, particularly in getting students set up and able to find their way around the system.

- 'Infoglut' or information overload, where the quantity of communications is difficult to deal with.

- The amount of time needed by students and teachers when communicating via CMC.

- Lack of participation, or uneven participation, possible due to students' fears about interacting online.

- Miscommunication or domination by some students, which may develop into flaming.

5. Social aspects of CMC in education

The reviews of benefits and problems in Sections 3 and 4 highlighted a number of social issues. These are concerned with how students relate to each other, and to their teachers, in an online environment. For example:

1   Can students (and teachers) get to know each other?

2   Do they feel that they are communicating with people (rather than with a computer)?

3   Can a sense of belonging develop?

These issues are important because they affect levels of participation and interaction, and therefore have an influence on learning. Unless students feel comfortable in an online environment, they may not participate openly, and so may not gain the benefits of the discussion, collaboration, questioning and help that that an online group can provide.

In the literature on CMC in education, these social issues tend to be discussed under one of two general themes: online community; and social presence. The theme of online community can be characterised by question 3 in the list above: in a community, participants feel a sense of belonging. The theme of social presence can be characterised by question 2: if there is social presence, participants feel that they are communicating with real people, even though the communication is mediated by communication technologies. Question 1 is relevant to both themes: in an online community

with high social presence, participants feel that they genuinely know each other.

Although there are close links between the concepts of online community and social presence, the literature related to these themes will be presented separately, in sections 5.1 and 5.2 below.

5.1 Online community

The concept of community originally related to a geographical area. People were considered to be members of their local community in their town, village or street. Then as computer-mediated communication tools were developed and used, the concept of community was extended to groups of people who had online connections with each other, but who were geographically dispersed (e.g. Rheingold, 1993; Baym, 1997; Wellman & Haythornthwaite, 2002). This raises the issue of what is meant by an online community. Rheingold (1993), who wrote about experiences of using the 'WELL' computer conferencing system, gave his explanation of what he called a 'virtual community':

> 'Virtual communities are social aggregations that emerge from the Net when enough people carry on [..] public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.' (p. xx)

Preece (2000, p. 10) defined an online community as consisting of:

> '*People*, who interact socially as they strive to satisfy their own needs or perform special roles, such as leading or moderating.

A shared *purpose*, such as an interest, need, information

exchange, or service that provides a reason for the community.

Policies, in the form of tacit assumptions, rituals, protocols, rules,

and laws that guide people's interactions.

Computer systems, to support and mediate social interaction and

facilitate a sense of togetherness.' [italics in original]

Preece's definition adds the ideas of shared purpose and shared ways of

interacting to Rheingold's focus on personal relationships mediated via

communication technology.

The concept of an online, or virtual, community has been applied by many

researchers in educational settings (Palloff and Pratt, 1999; Renningar &

Shumar, 2002; Garrison & Anderson, 2003; McConnell, 2006). For

example, Brown (2001) pointed out that community was important in an

online course for overcoming isolation, increasing student satisfaction and

retention, and supporting learning. She found that the level of community

feeling a student experienced was related to their level of participation in the

course. Some students felt no sense of community, possibly because they

had no need for it, could not commit the time necessary, or believed that

community could only be experienced face-to-face. Those who did feel a

sense of community reported that it took longer to develop online than it

would have face-to-face. Opportunities for students to learn more about each

other (e.g. through self introductions, or from the content, timing and tone of

messages) helped the process.

Haythornthwaite et al. (2000) studied the development of online community in a part-time Masters degree consisting of an initial face-to-face 'boot camp' followed by study via asynchronous and synchronous communication. Interviews with students revealed that they felt a sense of belonging, and that the initial face-to-face period helped by giving students a clear sense of others who were part of the community. One student commented:

> "Even though they would be just a name on a screen in the chat room or on the webboard, you still had the memory of knowing them from boot camp, which was such an intense experience. That gave you a connection. It was almost like they were there. You could imagine them." (Haythornthwaite et al., 2000)

Some students, however, did not experience a sense of attachment, but instead felt anxious about working online. They reported needing to make more effort to stay involved, compared to a face-to-face setting. Students said that synchronous communication was helpful in alleviating feelings of isolation, and some students used email in a near-synchronous way when online at the same time as others. The authors concluded that students need:

> 'multiple means of communication: public and private, synchronous and asynchronous, multi-party and one-on-one, distanced and face-to-face for sustaining group interaction.'

Conrad (2002) also found that face-to-face meetings were important to online learners for visualising those with whom they were interacting. In

fact one student expressed concern when a group photo was removed from the course web site. Many students made efforts to build community, although this took some time. An increased sense of community helped them to feel comfortable taking part in intellectual exchanges online. However, the downside was an increase in 'side-chatter' and numbers of messages. Dealing with these could be distracting and time-consuming.

5.2 Social presence

The concept of social presence has been used by many researchers when considering the social aspects of CMC (Gunawardena & Zittle, 1997; Preece 2000, p. 150; Rourke et al. 2001). The term originated with Short, Williams and Christie's (1976) analysis of human communication via different media, where it was defined as the:

> 'degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships' (p. 65).

Definitions of social presence have been given subsequently by other researchers. That of Gunawardena and Zittle (1997, p. 8) seems to express the idea clearly and succinctly:

> 'the degree to which a person is perceived as "real" in mediated communication.'

Social presence can be viewed as primarily a characteristic of the communication medium. From this perspective, the telephone offers higher social presence than email because participants can hear each others' voices; a video link would offer yet higher social presence. This focus on the

medium of communication is in line with Daft and Lengel's (1986) concept of 'media richness'. However recent research considers the behaviour of the communicators as a contributor to social presence (see below).

Gunawardena and Zittle investigated whether social presence affected the degree of satisfaction of learners who were communicating via CMC. A questionnaire given to participants measured (among other characteristics): participants' sense of social presence; and their satisfaction with the computer-mediated learning experience. The results suggested that social presence was a strong predictor of satisfaction. The authors concluded that:

> 'In spite of the characteristics of the medium, student perceptions
> of the social and human qualities of CMC will depend on the
> social presence created by the instructors/moderators and the
> online community.' (p. 23)

Rourke et al. (2001) used a different approach to measuring social presence, considered to be part of a larger framework for online learning (Garrison & Anderson, 2003). They carried out a content analysis of students' messages in two computer conference used as part of separate courses, using different CMC systems (FirstClass and WebCT). The authors found that the two conferences had quite different levels of social presence, and that this finding was in line with the impressions of the researchers studying the two conference transcripts. They stated that:

> 'High scores indicate that the environment is warm and collegial.
> Participants feel a sense of affiliation with each other and a sense

of solidarity with the group. This environment of approachability

and closeness encourages the students to regard the conference

and their interactions as valuable and educationally profitable.'

Swan (2002) used Rourke et al.'s (2001) method to analyse social presence

in an online postgraduate course in educational computing. Swan argued

that her findings supported an equilibrium model of social presence, where:

'participants in online discussions make up for the lack of

affective communication channels by engaging in a greater

number of verbal immediacy behaviours' (p.43).

This brings us back to the findings of Conrad (2002), discussed in Section

5.1, that students make efforts to build community in an online setting.

When using a medium which does not itself provide cues to support

communication and community, some students use the content, timing and

style of their messages to add this 'social glue'. However, this takes effort,

time, and sensitivity, so not all students will be willing or able to do this.

6. Temporal aspects of CMC in education

The preceding discussions have focused primarily on asynchronous

communication, but synchronous communication can also have benefits in

educational contexts. In particular, synchronous communication may offer

higher levels of social presence because of the immediacy of the

interactions. Research exploring the possibilities of synchronous

communication is considered below. Studies of the use of synchronous chat

tools in education are discussed first (Section 6.1). Then studies of the use

of instant messaging, both for education and in the workplace, are considered (Section 6.2).

6.1 Synchronous chat

In a synchronous chat system (often called a chat tool or chat room) participants are online at the same time. Chat discussions can be one-to-one, but in educational contexts they are often group discussions, and may be facilitated by an instructor. Participants interact by typing messages, and these appear on-screen preceded by the writer's name (or the name they have chosen to use). The interactions are normally shown in a simple chronological list, which means that different participants' messages, and possibly different topics of conversation, may be interspersed. This can make chat interaction confusing, particularly if there are several participants. Moreover, a certain competence in typing is needed in order to take part in the quick-fire of the interactions. In spite of these disadvantages, chat can be a lively and engaging medium, which is perhaps why some educators have been keen to explore its possibilities.

Honeycutt (2001) compared asynchronous and synchronous communication for peer-review tasks in courses on writing. Students gave feedback to others via email or via a chat system. When using synchronous chat, it was found that reviewers exhibited greater personal involvement with the writer. There was also more off-topic and social behaviour, which although enjoyable, was distracting to students. When using email, the communication was largely one-way and one-to-one, from reviewer to writer. There was little dialogue between reviewers and writers or between

those reviewing the same document. However, email allowed time for careful reflection on the document, and more detailed feedback. Overall students felt that email was more helpful for this task, but the author suggested that synchronous communication would be valuable at earlier stages of the writing process (e.g. for generating ideas).

Kirkpatrick (2005) elaborated on the aspect of off-topic interactions when students are using a chat tool. His study was based on a short trial of the synchronous chat tool in the Blackboard VLE, used as a supplement to a face-to-face course. A two-hour session using the chat tool appeared initially to be anarchic, and dominated by social interactions. However, analysis of the transcript revealed that nearly half the interactions were discussion of the class content, and others were greetings, questions about the technology etc. Students felt that the experience was enjoyable but not useful for learning. Nevertheless, the author's interpretation was that use of the chat tool was beneficial in increasing students' confidence, and in changing the balance of power between the students and the lecturer.

Kirkpatrick's findings were partly supported in a study by Cox et al. (2004), who used chat in two courses which were primarily delivered face-to-face. In one of the courses students used chat for several lab-based discussion sessions. The first session contained a significant proportion of social interactions, but as students gained experience the discussions became more focused. Students reported that they enjoyed the chat sessions, but that they were not really integrated into the course. In the second course, the chat tool was used as part of a group role-play exercise, and this seemed to be more

successful. Students engaged with the task and found the use of the chat tool empowering and motivating, though also frustrating at times.

Pilkington et al. (2000) investigated the use of synchronous chat in the WebCT VLE. In a course with both full-time students and distance learners, a weekly two-hour face-to-face class was supplemented by a weekly one-hour chat session led by the course tutor. The researchers reported that nearly half students' interactions were content-related and of good quality. However, participation by the part-time students was low, largely because of the timing of the sessions, and the discussions were dominated by the tutor and two or three students. A subsequent presentation of the course used a bulletin board (similar to a computer conference) as well as chat. The authors judged that neither of these tools adequately fulfilled the distance students' needs for a sense of presence. However students felt that chat was better for this purpose, because of the speed of response. These findings are in line with the views of McInnerney and Roberts (2004), who suggested that:

> "Asynchronous communication may not give the immediacy that is required for successful social interaction." (p. 73)

6.2 Instant messaging

In 2004 the *Pew Internet and American Life Project* produced a report on the use of instant messaging in the USA (Shiu & Lenhart, 2004). The report defined instant messaging as follows:

'Generally, instant messaging is a text-based tool that allows users
to conduct conversations online by exchanging short messages in
near synchronicity over the internet. Instant messaging, often
abbreviated to IM, allows users to know which other users are
online and connected via a particular instant messaging program
(a feature known as presence), and depending on the system in
use, gives details about other buddies' availability.' (p. 1)

At the time of the report there were 54 million US instant messaging (IM)
users, corresponding to 42% of US internet users. The authors found that
views on IM varied considerably, particularly in relation to IM use in the
workplace. It was found that most users carried out some other activity
(online or offline) while they were using IM. About a third of IM users had
created a profile for others to see and some included a link to a personal
photo.

An earlier study (Nardi et al., 2000) focused on the use of IM in the
workplace, and suggested that it is used to 'maintain a sense of connection
to others' (p. 79), and 'to support quick questions and clarifications about
ongoing work' (p. 81). However a disadvantage was that it could be
distracting. To overcome this, recipients of IM requests did not always
respond straight away, and this was considered acceptable rather than
offensive. Senders often used a short enquiry message, such as 'Are you
there?', and waited for a response before proceeding. Compared with similar
communications via email, participants found that IM messages gave a
greater sense of a shared context. Users found value in knowing who else

was 'around', even if they had no need to make contact at that time. One participant commented:

> "You feel like you know where other people are, so you feel like you're not the only one working on a weekend. To me it's just fascinating to know that someone else is somewhere else doing something while you're doing something. You feel like you're in this world together, so you create a little universe." (p. 85)

Baron (2004), reporting on IM use by college students, confirmed that some users leave long intervals before responding, and that IM was effectively being used as an asynchronous technology by these students. This contrasts with the findings of Matthews and Scrum (2003) that student IM users found it difficult to resist responding immediately to instant messages (which were typically of a social nature). This appeared to have a negative effect on their concentration and academic work.

Hrastinski (2006) investigated the effect of introducing an instant messaging system into a distance learning course. The course already used asynchronous communication, but students found the time lags frustrating. It was found that half the students used the IM system fairly frequently and half did not. Most of the IM communication was within small work-groups, and the IM communication was focused on this work, rather than being used for social support. The lack of social interaction seemed to be partly because students on the course did not know each other well, and partly because there was not a critical mass of students online. Some students also reported

that they did not wish to socialise with others on the course - they preferred to work individually, which was why they had chosen distance learning.

Nicholson (2002) also investigated the use of IM in a distance learning course. The course was mainly taught asynchronously using the *WebCT* VLE, but at the request of students, an IM service was provided. A survey of students revealed that just under half used the IM facility, and that these were the younger students. Some students were concerned that IM would be distracting or time-consuming, and some were ambivalent about contacting other students whom they did not know. The students who used IM reported feeling a stronger sense of community with classmates than those who did not. They found IM particularly valuable for socialising and for communication not related to the course. One student commented:

> "Nothing else I used to communicate was as funny and friendly
> and warm as the conversations I had via IM." (p. 369)

Contreras-Castillo et al. (2004) also found positive outcomes from a system designed for instant messaging and presence awareness in an educational context. The study involved full-time students who were taking a number of online courses. The authors reported that use of the system increased the level of interaction among students and helped reduce feelings of isolation. Awareness of others who were online, and notifications of arrivals, were particularly important for helping students feel part of a learning group.

In conclusion, findings on the potential of IM for education seems to be mixed, and more research is needed in this area. However, there is an

indication that IM could be beneficial for enhancing social presence. When using an IM system, students may feel reassured to know that their colleagues are online and that they can easily communicate with them in real-time for help or just for personal contact.

7. Structural aspects of CMC in education

Most of the CMC issues discussed so far relate broadly to social aspects of the communication. However there are also issues related to the structure, organisation and volume of messages. These issues arise primarily in the context of asynchronous CMC, where all the messages are stored and must be organised into structures which participants can access.

The asynchronous and stored aspects of this type of communication have clear advantages for learners. These were summarised by Lobry de Bruyn (2004):

- The content of the discussions is always available.

- There is no need for turn-taking, as in a face-to-face discussion.

- Students have time to reflect on others' contributions and their own.

- Students can take part in discussions at any time, and from any location.

However, in an online learning environment where participants are active and engaged, the messages can build up rapidly over time. This is particularly so in larger groupings, and can cause participants difficulties (Ruberg et al., 1996, p. 246; Hiltz & Wellman, 1997 p. 48; Rennie &

Mason, 2004, p. 11). Students may even feel so overloaded that they withdraw from the online environment (Paloff & Pratt, 1999, p. 50; Hiltz & Turoff, 1985, p. 682).

One problem is the amount of time needed to keep up with the discussions. A student quoted in Salmon (2000, p. 86) said, about CMC:

> "It is useful but gets clogged with messages that don't add value for me. I wasted a lot of time on it initially and felt inadequate when I couldn't keep up with all of the new messages, but I do find I get some useful info. I tend to set a time limit and stick to it."

This student's comment also raises a related aspect of the overload problem, which is the difficulty in picking out useful messages from those that are less useful (Mason, 2001; Kear & Heap, 2007). This issue is discussed further below, together with other aspects of information overload.

7.1 Information overload

A number of researchers have considered the problem of information overload in relation to e-mail. For example, Denning (1982) characterised the problem as 'electronic junk' and suggested various filtering mechanisms, as did users interviewed by Bawden et al. (1999). According to Adam (2002, p. 88)

> 'many people complain that the bulk of the problem arises from messages they are not interested in receiving and that these stop them from dealing with the important ones.'

Whittaker & Sidner (1997) investigated how people dealt with their email. They found that:

> 'certain individuals experienced major problems in reading and replying to email in a timely manner, with backlogs of unanswered email, and in finding information in email systems.' (p. 280)

They suggested that the problems could be alleviated by system features such as conversational threading, automatic filing and the ability to mark messages as needing attention.

Other researchers have considered information overload in relation to group communication systems. Palme et al. (1996) suggested that different kinds of message filters could be used to alleviate the problem. The authors suggested that user evaluations of messages could be used to provide 'collective filtering', as exemplified in the Tapestry experimental email system (Goldberg et al. 1992).

Hiltz & Turoff (1985) surveyed users of 6 different conferencing systems and found that most users reported sometimes feeling overloaded. From longitudinal studies with the EIES conferencing system, the authors also concluded that information overload reduced with time (although they pointed out that their data could also be explained if overloaded users were dropping out of the system). They noted:

> 'The need is for structures that will distinguish communications that are probably of interest from those that are probably not of

interest; these structures must also be useful for compacting, condensing, and organising information." (p. 682)

The authors pointed out that there is a trade-off between maintaining social cohesion and avoiding information overload. They emphasised that control must remain with users as to which information is filtered out, and that:

'There is a high degree of unpredictability in determining which communications might interest a user.' (p. 685)

7.2 Losing the thread

The volume of messages is not the only cause of a sense of overload. A significant factor is the confusion and disorientation which can arise when the messages are:

'not sufficiently organised by topic or content to be easily recognised as important or as part of the history of communication on a given topic.' (Hiltz & Turoff, 1985, p. 682)

Salmon (2000 p. 43) explained this further:

'CMC can elicit quite uncomfortable, confused reactions from participants and severe anxiety in a few. Although many people are now familiar with email, they are not used to the complexity of CMC's many-to-many conferencing, with its huge range of potential posting times and variety of response and counter response.'

The issue was also noted by Ruberg et al. (1996), who reported that some students found the 'multiple threads of simultaneous topics' (p. 266) confusing and jumbled.

Harasim et al. (1995, p. 223) agreed with Hiltz & Turoff (1985) that a feeling of confusion and overload is most often associated with the early stages of CMC use:

> 'Early in the course, as students learn to navigate around the system, the sense of being lost in cyberspace can trigger an experience of information overload. A sense of place has not yet been established, and the conference may feel like a maze. Additionally, students may send notes to the wrong conference, creating confusion for readers.'

When there are large numbers of messages posted at different times by different people and on different topics, it is important that the messages are grouped and organised. CMC systems have various mechanisms for doing this. Typically there are different conferences (also called discussion forums) for different purposes, and these may also have different memberships. For example, a student may be a member of a large conference for discussions with all the students on their course, and they may also be in a small-group conference for the more structured course learning activities.

Within a conference or forum, messages are usually grouped further into discussion threads. Users can start a new thread, or can add a message to an

existing thread. The purpose of threading is to allow users to follow a 'conversation' which is spread over time, and interspersed chronologically with messages from other 'conversations'. Each message in a thread normally has the same subject line, possibly preceded by 'Re:', and CMC systems typically provide tools for displaying threads and navigating through them.. As Hewitt (2001 p. 209) pointed out, threading:

> 'makes it easier for readers of the conference to find and follow conversational chains. [...] It also allows the class to simultaneously pursue multiple avenues of inquiry without confusion.'

Schwan et al. (2002) used an experimental approach to investigate the effect of threading on participants in a faked computer conference. Different groups of students were required to engage in a conference where messages were either:

- threaded i.e. all related messages had the same subject line, preceded by 'Re:' and a number indicating the sequence in the thread; or

- unthreaded i.e messages had different subject lines.

Using a 2 x 2 design, the study also investigated the effect of the number of irrelevant messages in the conference. The researchers found that in all four conditions students opened nearly all the messages, rather than using the subject line to decide which messages to open and which to leave unread. Students opened the messages in a topic-related order, rather than chronologically. The findings showed no significant differences in terms of

learning between the conditions. However, students using the threaded

conference posted over twice as many messages. They also experienced

fewer difficulties in finding relevant messages, linking them together and

generally understanding the discussion. In the conditions with fewer

irrelevant messages, students re-opened more of the relevant messages and

spent more time on them. The study showed that, although students can

cope with disconnected and irrelevant messages, threading facilities are

needed to help them to engage fully in online discussions.

The study by Schwan et al. used linear threads, which are simply a

chronological sequence of messages on the same topic. However, in many

CMC systems the threading is hierarchical in structure. Adding a message to

a thread involves 'replying' to one of the messages in it. This typically

creates a branching structure for the thread. Hewitt (2001) claimed that this

method of threading has a negative effect on CMC discussions, causing a

lack of convergence. He pointed out that threads can easily drift away from

the original topic of discussion. Hewitt claimed that these problems arise

largely because the 'reply' option encourages users to respond to a particular

message, rather than to the discussion as a whole. Hewitt suggested that a

linear discussion format might alleviate these problems, although it would

increase the 'cognitive overhead' on users (p. 215). He concluded that future

conferencing systems should adopt a network model, rather than a

hierarchical one, so that a single message could be a reply to several earlier

ones. He also proposed improved 'mapping' facilities for displaying the

relationships between messages.

In a later paper, Hewitt (2003) reported findings that students tend to reply to new messages while neglecting those earlier in the discussions. He claimed that this resulted in unintentional changes in the topics of discussion. Students abandoned existing discussions threads after a short time if no new messages were posted to them. Hewitt commented that, in current CMC systems, it is difficult for students to keep the overall context of their discussions in mind. He suggested interface redesigns, as exemplified in the CSILE project (Scardamalia et al. 1989) which make it easier to see all the messages in the current discussion thread.

8. Educational CMC systems

The preceding sections have considered the potential of CMC for educational settings, and have elaborated some of the benefits and problems. The discussion identified a number of social, temporal and structural issues which need to be considered. The question then arises as to what steps can be taken in order to realise the benefits of CMC and overcome the problems.

Arbaugh & Benbunan-Fich (2005) considered a number of factors which influence the effectiveness of CMC in education:

- technological characteristics;

- the instructor's pedagogy and behaviour;

- course characteristics;

- institutional characteristics.

Other researchers have focused on one or more of these aspects. For example there has been considerable attention given to the role of the teacher or facilitator (Salmon, 2000; Bonk et al., 2001; Coppola et al., 2002, Garrison & Anderson, 2003). Researchers have also investigated the part played by CMC within the course as a whole (Mason, 1998; Murphy et al., 2001). However, in recent years less attention has been paid to researching the CMC systems themselves.

Research on CMC systems in education tends to focus on systems that have been developed, as well as used, within educational contexts. For example:

- the Virtual Classroom (Hiltz, 1994);

- CSILE (Scardamalia & Bereiter, 1996);

- the Virtual-U (Harasim, 1999);

- TeleTOP (Collis & Moonen, 2001)

- the Inquiry Learning Forum (Barab et al., 2001);

- Tapped In (Schlager & Fusco, 2004).

In contrast, generic CMC systems, such as FirstClass and Lotus Notes, which are also used in education, have been subject to little research focused on the systems themselves. Similarly, the communication facilities of VLEs such as Blackboard, WebCT and Moodle, though widely used, have again not generally been researched from a system perspective.

During the early years of educational CMC, considerable attention was paid to the design of CMC systems, both in education (see Kaye, 1992) and generally (see Rapaport, 1991). There is also more recent work on CMC systems for non-educational settings, with a particular focus on tools to support online communities, and on web-based systems. Preece (2000) stressed the importance of designing communication software for sociability as well as usability. Kim (2000) and Powazek (2002) considered how web-based communication tools could be designed to build and support online communities.

There are some researchers who have given their attention to the characteristics of educational CMC systems. For example, Hiltz and Turoff (2002) stressed the importance of using appropriate software to support communication within a learning community. They considered it essential

that such software should have structures to group communications into topic areas and into threads of messages and replies. They also pointed out that other desirable features were not generally available in commercial systems, and that these systems could not adequately support long-lasting discussions among larger groups:

> 'What is needed for such large-scale social decision-support processes [...] is a set of templates that systematically solicit options and alternatives, build relationship diagrams, and solicit quantitative (voting) types of feedback as well as qualitative (text) reactions.' (p. 58)

Ahern (1993, 1994) investigated the effect of the user interface of an educational CMC system. He compared students' use of two versions of the system: a text-based version where messages were listed chronologically; and a graphical version where students positioned their messages spatially, explicitly linking them to existing messages. The author's hypothesis was that:

> 'because the graphic-based interface displays a visual relationship of previous messages, members are better able to sustain discourse in longer, more continuous interaction sequences' (Ahern, 1994, p. 238)

The study confirmed this hypothesis, finding that students using the graphical interface created significantly more messages than those using the text-based interface. Moreover, for the graphical interface, a higher

proportion of the messages were related to other messages, as opposed to being isolated contributions. These findings are consistent with those of Kear (2001), who also compared a graphical style of CMC interface with a textual one.

Warren and Rada (1998) carried out a comparison of two cohorts of students studying the same course with the same instructor, but using different CMC systems. The authors found that students in the second cohort, who were using a system with a more structured interface, contributed more messages. Their participation also increased with time, whereas participation in the first cohort decreased with time. However, because the cohorts were given different guidance on expected participation and links to the course assessment, it is not clear whether the improvement resulted from the increased structure of the CMC system or of the course itself.

Akar et al. (2004) carried out an investigation of students' experiences using a collaborative virtual learning environment. The context was a course where students from two different countries worked together on group projects. The system allowed students to make written contributions, link them together, comment on them, add keywords to them and rate them. It allowed users to see the contributions which were most highly rated or which received the most comments. Using surveys and interviews, the researchers elicited students' perceptions of the system. There were a number of technical problems and usability issues, particularly in navigation and negotiating the threads. Students reported that they did not trust the ratings of other students, and that they had some difficulties in working with

each other. They suggested that facilities such as video or instant messaging would help them to understand each other's ideas more easily.

Barab et al. (2001, 2003) have given an extensive reflective commentary on the development of the Inquiry Learning Forum (ILF), an online learning environment for teacher education, based on a community of practice model. An initial needs analysis among student and in-service teachers resulted in a design based on the idea of 'visiting classrooms' through video clips and online discussions. The site was developed using prototyping and user testing, but in spite of this, participation was disappointing. In particular, users felt uncomfortable, in an entirely online environment, posting criticisms of others' teaching. This was partly because they felt they did not know the other teachers or their contexts. Barab et al concluded that there is a:

> 'need for familiarity with the people in the community before online communications can be substantive, or even sometimes initiated.' (2003, p. 250)

The developers therefore decided to focus on the concept of sociability (Preece, 2000) in the design process. Their aim was to redesign the online environment so that community was fostered and the value of engaging in dialogue with others outweighed the time costs of participation. Smaller groupings of participants were established, and a 'Mydesk' facility allowed for personalisation, such as the inclusion of a member profile and photograph, and 'bookmarks' to particular areas of the ILF. The designers

acknowledged the difficulties of designing for sociability, and also its importance:

> 'There are literally thousands of design decisions that go into an online project as complex as the ILF and each of these decisions could be regarded as a limit - or a boon - to emergent community'(2003, p. 249).

The review of research in this section has focused on systems used for educational CMC. The studies reported have shed some light on aspects of CMC system design, but have also indicated that there is more work to be done. In particular, research is needed to discover characteristics of CMC systems which will encourage participation and collaboration. This research therefore needs to encompass the sociability aspects of CMC systems as well as the usability aspects (Preece, 2000).

In the remainder of this chapter (Sections 9 to 11), we move on to consider methods which could be used for this research. Methods used in both educational research and system design are relevant for the investigation of educational CMC systems, so methods from both these fields are discussed. In fact, the approaches used in these two field have much in common (see Preece et al., 2002). Section 9 discusses approaches used in educational and social research (but which have also been adopted for system design). Section 10 focuses specifically on system design approaches. Section 11 completes the chapter by discussing the methods chosen for the present research, and the rationale for these choices.

9. Social and educational research methods

This section reviews research approaches which are used in the social sciences, and more specifically for research in education. Methods for gathering data and analysing it are discussed, together with issues of reliability and validity.

9.1 Quantitative and qualitative approaches

Research approaches in the social sciences are often categorized as quantitative or qualitative. This division concerns the type of data which is gathered and the way in which it is analysed. However it also reflects a historical and philosophical difference:

> 'Quantitative researchers usually base their work on the belief that facts and feelings can be separated, that the world is a *single reality*, made up of facts that can be discovered. Qualitative researchers, on the other hand, assume that the world is made up of *multiple realities*, socially constructed by different individual views of the same situation.' (Fraenkel & Wallen, 2006, p. 15) [italics in original]

This difference is reflected in the different objectives and methods of the two approaches. For example, a quantitative researcher might investigate a relationship between two variables by means of an experiment. A qualitative researcher might try to gain understanding of a situation by carrying out in-depth interviews.

Creswell (2003, p. 22) discusses how researchers might decide which approach is appropriate for a particular study. For example, quantitative approaches are useful for testing a theory or for identifying the factors which influence an outcome. Qualitative methods are appropriate if the researcher does not yet know which factors are important to investigate. Creswell also presents a third, 'mixed methods' approach, which combines quantitative and qualitative methods. According to Creswell (p. 18) a mixed methods approach:

> 'employs strategies of enquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both numeric information (e.g. on instruments) as well as text information (e.g. on interviews) so that the final database represents both quantitative and qualitative information.'

A mixed methods approach can have the benefits of both quantitative and qualitative methods. For example, a research study might start with a large-scale survey to pick out key issues of concern, and then carry out interviews to gain a deeper understanding of the issues. Alternatively a study might start by eliciting issues from exploratory interviews, and then use a survey to assess the significance of the issues in a larger population.

The use of multiple methods can also contribute to 'triangulation' (Miles and Huberman, 1994 p. 41). The concept of triangulation in the social sciences is based on the original meaning of the term, where several

measurements are taken in order to find an accurate location. In the social

sciences an analogous practice is to use several different methods to

research the same phenomenon. This helps to reduce the possibility that the

findings are artefacts of the method used (Cohen et al., 2000, p. 112). The

term is also applied to research where data is gathered at different times or

places, or with different groups of participants, or using different observers.

The concept of triangulation as a way of identifying a single, true reality has

been criticised by some qualitative researchers, who claim that research

findings in the social sciences are highly situated and that therefore there is

no single 'truth' to be found (see Silverman, 2006, p. 291). However, even

taking this viewpoint into account, triangulation can add to the richness and

depth of a research study.

9.2 Validity and reliability

Triangulation is one example of attempts to improve the validity and

reliability of research. According to Fraenkel & Wallen (2006, p. 150),

> '*Validity* refers to the appropriateness, meaningfulness,
>
> correctness and usefulness of the inferences a researcher makes.
>
> *Reliability* refers to the consistency of scores or answers from one
>
> administration of an instrument to another and from one set of
>
> items to another.' [italics in original]

The concept of validity was originally applied to quantitative research, and

referred to whether a method actually measured what it was intended to

measure. However, as the quotation above indicates, the term has taken on a

broader meaning in recent years. Now the concept is also applied to qualitative research, and refers to whether the interpretation is appropriate, given the data on which it is based (Fraenkel & Wallen, 2006, p. 151; Cohen et al., 2000, p. 105).

The concept of reliability relates to whether the findings of a method are self-consistent and repeatable. For example, if a questionnaire were designed to measure an aspect of personality which is assumed not to change, then the questionnaire should produce similar results for the same person on different occasions. Similarly, if different items in a questionnaire were designed to measure the same characteristic, then scores for the same person on these items should be largely in agreement. A research method cannot be valid if it is not reliable. Without reliability the method may be measuring several different things, or measuring different things on different occasions. However, even if a method is reliable it may not be valid.

One issue which affects the usefulness and generality of a research study is sampling (Cohen et al., 2000 p. 92). Research cannot be carried out on everyone to whom the findings may eventually apply (the target population) so a sample of the population must be used. Ideally this sample should be as representative as possible of the target population. There are a number of methods for sampling, though not all of them will be possible in a given research setting. One approach is random sampling, where participants are drawn at random from the population. Another is purposive sampling, where the researchers use their own judgement or knowledge to select a suitable sample of participants. When it is difficult to select a sample by other

means, researchers may need to use convenience sampling, which simply means using those participants who are available. When this type of sampling is used it is important to provide information about the participants (such as age and gender) and if possible to repeat the research with another sample (Fraenkel & Wallen, 2006 p. 100). Depending on the research method, the size of the sample also needs to be considered. It should be large enough so that any numerical analysis is meaningful, and the results can be sensibly generalised. However, when generalising results it is important that the findings from one setting are not simply assumed to be valid in another.

9.3 Methods for data gathering

There are a number of data gathering methods used in educational research, and many of these can also be used in system design. Methods can be broadly categorized as quantitative or qualitative in nature, but this division is not clear-cut. For example, a questionnaire would typically be considered as a quantitative method, but it could also include open questions. Similarly, an interview is typically part of a qualitative approach, but the results from a set of interviews can be coded and analysed numerically.

A number of relevant methods for data gathering are discussed below. These are:

- questionnaires;

- interviews;

- observation;

- experiments.

Questionnaires

Questionnaires have the advantage that they can provide standardised quantitative data. If a highly structured questionnaire is used with a large sample of participants, the resulting data can be analysed statistically, allowing comparisons and generalisations to be made. Moreover, the resulting data can be analysed without excessive time or difficulty. Alternatively, a less structured questionnaire, with more open questions and free format responses, can elicit richer feedback. This can provide more insights and ideas – provided the questions are worded in such a way as to inspire reflection by participants. This form of questionnaire works best with a smaller sample, so that the time and effort required to analyse the data is reasonable. Jordan (1998, p.66) suggests that open-ended questionnaires are suitable for the early stages of product design, in order to help define the issues, while fixed-response questionnaires are of value once users have had an opportunity to try a product or prototype.

A practical advantage of questionnaires is that most of the work is in preparation of the questionnaire and analysis of the results (the balance of time on these two activities depends on the degree of structure in the questionnaire). There is no necessity to arrange meetings with respondents. A disadvantage of questionnaires is that, to a degree, they anticipate what users might say. This is particularly true of highly structured questionnaires, where response categories must be determined beforehand; but even an unstructured questionnaire will reflect the presuppositions of the researcher

to some extent, which could limit the data obtained. Another disadvantage is that the response rate may be low, or respondents may not answer all the questions. If a longitudinal approach is followed, with several surveys of the same people over a period of time, there may be a lower response to the later surveys. As well as reducing the amount of data available, a low response rate could mean that the respondents are no longer a representative sample (Fraenkel & Wallen, 2006, p. 409).

Questionnaires must be carefully designed if they are to elicit the information which is required. Questions and response options need to be clear and unambiguous, and without any underlying bias. The wording, order, layout and number of questions needs to be carefully considered, so that the questionnaire can be answered easily by respondents. For example, it is helpful to start with straightforward questions based on factual data, and to move later to questions which require more reflection from respondents. Questionnaires are normally paper-based, but there is increasing interest in online questionnaires (Preece 2000, p. 313; Preece et al. 2002, p. 405). This method of data collection can save considerable time in processing the data. However response rates may be lower, and sampling may be unrepresentative.

Interviews

Compared with a questionnaire, an interview provides a more flexible context which allows for probing issues in more depth, or for exploring a wider range of issues. These may be points raised by the interviewee, which the researcher may not have anticipated. The interviewee can also ask for

clarification if necessary, and the interviewer can add further questions or explanations (Jordan, 1998 p.68). Just as for questionnaires, interviews can be positioned at different points on the structured-unstructured continuum (Preece, 2000, p. 319). Interviews of an exploratory (less structured) nature can capture a range of perspectives and new ideas, while more structured interviews will ensure that the key questions are asked of every participant. As with questionnaires, it is advisable to carrying out a pilot interview.

A disadvantage of interviews compared to questionnaires is that the interviewer might have undue influence on the responses of the participant(s), or might impose his/her own interpretation on those responses, bringing in bias (Cohen et al., 2000, p. 268). The views or presuppositions of the interviewer could influence the direction of the interview, or could stifle the inputs of participants. Seidman (2006, p. 23) explains:

> 'Although the interviewer can strive to have the meaning being made in the interview as much a function of the participant's reconstruction and reflection as possible, the interviewer must nevertheless recognize that the meaning is, to some degree, a function of the participant's interaction with the interviewer.'

Interviews can be carried out by telephone, or even by email, as well as face-to-face. Clearly something will be lost in a telephone or email interview, where non-verbal communication is missing, and it may be difficult to establish rapport. However this disadvantage must be weighed against the

advantages that there is no need for travel, and that participants can be interviewed at a time that suits them best.

Interviews need not be one-to-one; group interviews are another possibility. One form of group interview is a focus group (Morgan, 1997). This is a gathering of participants (typically between 6 and 10 people) who engage in a facilitated group discussion of an issue or issues. Jordan (1998, p. 56) suggests that focus groups are useful in product design, particularly at the early stages, when eliciting requirements from users. The data from a focus group is obtained through group discussion, rather than by a question-and-answer process:

> 'The hallmark of focus groups is their explicit use of group interaction to produce data and insights that would be less accessible without the interaction found in a group.' (Morgan, 1997, p. 2)

Although the interaction among participants is the most important aspect of a focus group, the facilitator will typically have a pre-prepared schedule of questions or topics to guide and encourage the discussion. Focus group sessions needs careful facilitating to keep them open-ended but also to make sure they address the research questions. They are often used in combination with other methods, such as questionnaires.

Observation

Observation techniques have the advantage of moving beyond participants' perceptions and reported actions, and providing data on what they actually

do. Moreover, by observing real practice, researchers are able to gain insights into the context and situations of the participants. They can see things which might be missed by relying only on what participants say. However, these benefits can be countered by the claim that such observation is a behaviourist research method, which cannot gain access to participants' intentions and motivations. Moreover, being observed is likely to alter participants' behaviour. A further problem is that the researcher must interpret observations in some way, and this interpretation might bring in bias (Fraenkel & Wallen, 2006, p. 452). It is therefore advisable to combine observation with other methods, such as interviews, in order to triangulate the resulting data.

Observation can also be carried out by participation in the activities which are being observed (participant observation). For example, a CMC researcher might join an online discussion in order to gain an inside view of the experience (Baym, 1997). Participant observation may be overt or covert, but in the latter case the ethics of the research would need to be carefully considered (Fraenkel & Wallen, 2006, p. 450). Participant observation is related to ethnography (see Section 10.2), where a researcher becomes involved in the activities of the people being studied, as well as undertaking interviews, in order to gain an in-depth, holistic understanding (Preece et al., 2002, p. 370).

Experiments

In an experimental approach, the researcher deliberately manipulates a situation in order to investigate a hypothesis (Cohen et al., 2000, p. 211;

Faulkner, 2000, p. 146). Typically one factor (the 'independent variable') is changed by the researcher in order to measure the effect on another factor (the 'dependent variable'). The aim is to ascertain whether a change in the independent variable causes a change in the dependent variable. For conclusions about causality to be drawn, it is important that other factors are held constant. One way to do this is to assign participants at random to an experimental group and a control group (Fraenkel & Wallen, 2006 p. 268). This is sometimes described as a 'pure' experimental design. If other factors are the same for both groups, any change in outcome (dependent variable) can be attributed to the difference in the independent variable. In practice, assigning students randomly to different groups is often not possible. In these circumstances researchers carry out 'quasi-experiments' where this requirement is relaxed (Fraenkel & Wallen, 2006, p. 277).

A number of different experimental research designs can be used (Rosson & Carroll, 2002, p. 246; Preece, 2000, p. 331). A 'between-subjects' design uses different groups of participants. The main problem with this design is ensuring that the groups are equivalent. This means that the groups need to be fairly large, otherwise individual differences will distort the results. Participants can be allocated to groups at random (the 'pure' experimental design described above), or matched on certain criteria, such as gender or age, with one of each pair allocated to each group. A 'within-subjects' design uses a single group, assigned to different treatments and measures at different times. The main problem with this design is that factors other than the variables under consideration could change between one measure and

another. To counter this 'order effect', the group can be divided, so that half the participants undergo the treatments in one order and half in the other order (Faulkner, 2000, p. 150).

9.4 Methods for data analysis

Once the data has been gathered, it needs to be analysed and interpreted. Again, the distinction between quantitative and qualitative approaches can be made.

Quantitative analysis

For quantitative approaches the data needs to be manipulated numerically so that it can be presented and interpreted. For example, with survey data the percentages of respondents selecting the different response options are calculated and can then be given as tables or graphs. With some kinds of quantitative data it is appropriate to report mean, median or mode values. Statistics such as these, which characterise the data, are called 'descriptive statistics' (Fraenkel & Wallen 2006, p. 189).

It may also be valuable to use 'inferential statistics' in order to investigate whether a research finding from a particular sample can be generalised to the wider population. Calculations (statistical tests) are carried out to establish the probability that a given result from a given sample occurred by chance ('the null hypothesis'). If the probability of this is found to be small (typically, probability values of $p < 0.05$ or $p < 0.01$ are used as criteria for 'small') then it is assumed that the finding is not a chance occurrence. The null hypothesis can then be rejected, and the result is said to be 'statistically significant'. The finding can therefore be generalised with some confidence

from the sample to the wider population (Fraenkel & Wallen, 2006, p. 228). However, inferential statistics should be used with caution, because they are based on certain assumptions about the population and the sample.

Qualitative analysis

For qualitative research approaches, data is typically analysed by a process of coding (Bogdan & Biklen, 1992, p. 165; Miles & Huberman, 1994, p.55). This involves an in-depth study of the data in order to identify categories and themes. Extracts from the data are assigned to particular categories by allocating them a code, which may be a number or a textual description. Codes may be grouped or subdivided, and extracts are often allocated more than one code.

Qualitative data can be analysed using a pre-determined set of codes. For example, a group of researchers could share out the work of analysing a number of datasets, using codes which they had agreed beforehand. An alternative approach is for the researcher to develop the codes from the data as the analysis proceeds. This is the method adopted in the 'grounded theory' approach to qualitative research (Glaser & Strauss, 1967; Strauss & Corbin, 1998). In this approach:

> 'The researcher begins with an area of study and allows the theory to emerge from the data.' (Strauss & Corbin, 1998, p. 12).

Grounded theory approaches involve a number of systematic methods for gathering and analysing data (Charmaz, 2003; Silverman, 2006, p. 96), and

the details of these have been subject to some debate (Glaser, 1992). Strauss and Corbin (1998, p. 46) comment:

> 'Although researchers may pick and choose among some of the analytical techniques that we offer, the <u>procedures of making comparisons, asking questions and sampling based on evolving theoretical concepts</u> are essential features of the methodology. They differentiate it from other methods and provide the means for developing theory.' [underlining in original]

Analysing qualitative data using a grounded theory approach, or other methods based on coding, can be very time-consuming. In order to facilitate the process, several computer software applications have been developed (Seale, 2003). These allow codes to be created and assigned to extracts from the data. The software also enables researchers to define relationships among the codes in order to develop emergent theory.

The methods described so far for data gathering and analysis are also used in the design of computer-based systems. For example, methods such as interviews and observation form part of user-centred approaches to system design. These approaches are discussed in the next section.

10. User-centred methods for system design

This section discusses methods for system design which are based on close involvement with users or potential users. Designers of computer-based systems, and other products, are increasingly taking a user-centred (also called 'participatory') approach, in order that their products are grounded in

the needs and characteristics of users (Schuler & Namioka, 1993; Ford & Wood, 1996).

10.1 User-centred design

A number of approaches have been developed for gaining input from users to the design of a product or system. The philosophy is to involve users closely in the process of design, particularly in the early stages where system requirements are identified. This user-centred approach contrasts with earlier design approaches where users were largely ignored by product designers, resulting in frustrating or unusable systems (Norman, 1998).

The usability of a system has been defined in terms of three aspects (see Jordan, 1998, p. 18-23):

- 'Effectiveness: the extent to which a goal, or task, is achieved';

- 'Efficiency: the amount of effort required to accomplish a goal';

- 'Satisfaction: the level of comfort that the user feels when using a product and how acceptable the product is to users as a vehicle for achieving their goals.'

Activities aimed at improving the usability of a system have been described as 'usability engineering' (Faulkner, 2000; Rosson & Carroll, 2002). Usability engineering was originally focused on evaluating and improving existing systems, particularly in terms of their user interfaces. Attention was paid to how easy a system was to use and to learn. However, the discipline has broadened to include consideration of the functionality needed within a system (Rosson & Carroll, 2002, p. 14).

These processes are also encompassed in the term 'interaction design', which Preece et al. (2002, p. 12) break down into four activities:

'1. Identifying needs and establishing requirements.

2. Developing alternative designs that meet those requirements.

3. Building interactive versions of the designs so that they can be communicated and assessed.

4. Evaluating what is being built throughout the process.'

User-centred design activities can make use of questionnaires, interviews, focus groups, observation, experiments and prototypes. Different techniques can be used at different stages in the design process. To get ideas at an early stage, designers can review existing products with users, carry out observations or undertake interviews or questionnaires. Then at later stages, prototypes can be developed and evaluated by users (see Section 10.3).

An important aspect of user-centred design is to consider who the users are (Faulkner, 2000). For many systems there will be several different categories of user to be considered. For example, educational computer systems are used by teachers as well as learners and these user groups will have somewhat different requirements, approaches to the system, and modes of use.

There are a number of methods aimed at gathering information about how users work with a system. One example is the 'think aloud protocol' (Jordon, 1998, p. 57) where user are asked to speak their thoughts out loud

while working with a system. The user might be doing their own work, carrying out specific evaluation tasks, or simply exploring the system. It is sometimes necessary for the observer to prompt the user so that they keep speaking their thoughts, and some users find the process difficult (Faulkner, 2000, p. 156). Cotton & Gresty (2006) discussed the advantages and disadvantages of the method for evaluating an e-learning resource. They found that:

'On some occasions the researcher seemed to be getting a 'tour' of the resources, in which students demonstrated the parts they liked or disliked. Other students appeared to be moving through the resource at such high speed that it was doubtful whether they could have read even a small proportion of the text viewed.' (p. 51)

Nevertheless, the authors concluded that the method was eliciting students' genuine thoughts, and revealing information which could not have been obtained using other methods.

10.2 Field work and ethnography

Field work plays a major role in user-centred design. It is considered important to gain input from users while they are working in their own contexts (Jordan 1998 p. 63; Rosson & Carroll, 2002, p. 238). A number of activities can be carried out in order to gain this user input:

'Typically, field work involves some combination of observation, informal interviewing, and participation in the ongoing events of the community.' (Blomberg et al., 1993, p. 124)

One way of carrying out the observation element of field work is to use a 'naturalistic' approach. Here there is no explicit interaction between the user and the observer, and the observer aims to be as unobtrusive as possible (Faulkner, 2000, p. 168). This approach has the advantage of minimising the disturbance to the user's normal patterns of work.

An alternative approach includes interaction between the observer and the user. The user may comment on what they are doing, perhaps indicating aspects of the system which they find difficult, or highlighting features which are useful. The observer may ask questions in order to understand the user's actions. This approach has the advantage that the observer is able to gain ideas about the user's intentions and the reasons for what they are doing. Extending this approach further, the system designer can become involved in the activities of users, as well as observing users and speaking with them. These type of studies are described as ethnographic. Blomberg et al. (1993) have suggested that an increasing focus on collaborative work, and in particular CSCW (computer support for collaborative work) may have been a driver for an interest in ethnographic methods.

One specific ethnographic approach is contextual inquiry (Holzblatt & Jones, 1993). In contextual inquiry, designers observe and talk to people in their actual work context, and ask questions while users are carrying out

their work. Contextual inquiry is generally carried out as a team process with design team members going out into the field to carry out 'contextual interviews'. Between each set of interviews the team meets in order to discuss and analyse the findings. This can be done by gradually building an 'affinity diagram', which creates a hierarchical structure for the different findings and ideas. Contextual inquiry has been extended to form part of a broader process called contextual design (Holzblatt & Beyer, 1996) which includes modelling and prototyping activities to help designers move towards the desired system.

10.3 Prototyping

Prototyping is a well-known method for involving users in the development of a system (Ford & Wood, 1996, p. 275; Preece et al., 2002, p. 240). A prototype is a rapidly-developed product which looks and behaves somewhat like the proposed system. Users are asked to try out the prototype and suggest amendments, which can then be quickly implemented and re-evaluated. As Hiltz (1994, p. 31) explains,

> 'In designing a new application, it is not possible for prospective users to know ahead of time what they will want. Rather, the users must gain some experience with prototypes. Then they are in a position to critique those prototypes, and make suggestions for improvements.'

Prototypes can be categorised as low-fidelity or high fidelity (Rosson & Carroll, 2002, p. 206). A low-fidelity prototype does not look very similar to

the final product. It may even be a 'paper prototype' consisting of sketches of screens on pieces of paper which can be manipulated to imitate the system behaviour (Holzblatt & Jones, 1993). Low fidelity prototypes are quick to produce, and allow alternative designs to be explored easily with prospective users.

Alternatively, high fidelity prototypes can be built in software and tried out by users (Preece et al, 2002, p. 245). These are useful in the later stages of the design process, for users to explore proposed system features and user interface elements. Observations, measurements and controlled experiments can be used to compare specific design solutions and to consider the overall usability of the system.

Sections 9 and 10 have summarised methods used in educational research and in system design, focusing on methods relevant to the present investigation. The final section of the chapter (Section 11) explains the methods which were chosen for the investigation, and discusses how they were applied.

11. Selection of research methods

The aim of the research was to investigate how an educational CMC system might be improved. As discussed in Chapter 1, a two-stage research approach was adopted. As a first stage it was considered important to gain the views of learners and teachers on the benefits and problems they experienced and their ideas about current and future CMC systems. This is discussed in Section 11.1 below. The second stage of the research was to

evaluate system features which might enhance the benefits users had identified and alleviate the problems. This stage is discussed in Section 11.2.

11.1 Gaining users' views and ideas

The first stage of the research aimed to elicit learners' and teachers' ideas about:

- the benefits and problems of using CMC systems;

- existing system features which are helpful, or unhelpful;

- possible system improvements.

For this stage of the research the primary research method selected was interviewing, because it offered the opportunity to gain a broad range of ideas and suggestions from learners and teachers. Interviews were considered to be preferable to questionnaires for this purpose because they could provide a more open and personalised context. This could encourage users to give their thoughts on different aspects of CMC as these thoughts arose. In contrast, using questionnaires could limit users' responses to a pre-defined set of topics, which might not be so fruitful. Interviews were therefore carried out with Open University students and tutors, and with teachers at face-to-face universities who used CMC as part of their courses.

With the same aim of gaining a broad perspective from users, the idea of focus group interviewing seemed attractive. A focus group could stimulate a 'brainstorming' style of interaction and discussion, where a contribution from one participant would trigger ideas from others. The result could be the

elicitation of views and suggestions which might not arise during individual interviews. However, it proved difficult to manage the practicalities of obtaining enough volunteers for interviews, and then finding a time when they could all meet. Therefore only one focus group - with students - was carried out.

Following on from the literature on user-centred design approaches, it was decided to use in-context observation as a further research method wherever possible. In line with a 'contextual inquiry' approach (Holtzblatt & Jones, 1993), observing users and interacting with them while they were using CMC systems would provide additional data. Moreover, if users had hands-on access to the live system, this could trigger thoughts and ideas which might not otherwise arise during the interview.

The data from this stage of the research was analysed using an approach based broadly on grounded theory. The aim was for themes and ideas to emerge from a detailed analysis of the interview data. However, the three groups of interviewees were identified beforehand, rather than using grounded theory's 'theoretical sampling' method, in which additional participants are selected on the basis of emerging ideas as the data is analysed (Charmaz, 2003). The three user groups identified for this stage of the research were: Open University students; Open University tutors; and teaching staff at face-to-face universities who used computer-mediated communication as part of their courses.

The data analysis resulted in several emergent themes. As mentioned earlier, the main themes which were relevant to all three user groups were the problem of information overload and the need to enhance social presence.

11.2 Investigating possible system enhancements

Having obtained users' views on the benefits and problems of CMC, and their ideas about CMC systems, the second stage of the research aimed to investigate design features of a CMC system which might increase the benefits and alleviate the problems. This stage focused on the two main themes of information overload and social presence. System enhancements were considered which might alleviate information overload and increase social presence. Ideas for possible system enhancements resulted from:

- analysis of the interview and observation data from the first stage of the research;

- learners' and teachers' own suggestions during the first research stage;

- knowledge of existing CMC systems;

- the literature on educational CMC.

An approach based on prototyping, field study, experiments and questionnaires was adopted for this stage. A prototype web-based conferencing system was used as a test-bed for evaluating a number of system tools and features aimed at decreasing overload and enhancing presence. These were implemented in the prototype system and evaluated with students. As mentioned in Chapter 1, this stage of the research was

carried out during a series of presentations of a short Open University

course: TT380 *Databases within web site design*. Students used the

prototype conferencing system as their main communication tool for the

course, and the system also provided a case study for parts of the course

content.

The prototyping stage of the research was carried out as two studies. For the

first study, system features aimed at alleviating overload were investigated.

For this study, a quasi-experimental approach was used, where all students

experienced two versions of the prototype system: a 'basic' version; and

then an 'enhanced' version, which included the new features. Questionnaires

gathering quantitative and qualitative data from students were used to

investigate whether the new features helped alleviate overload.

The second prototyping study investigated features aimed at enhancing

social presence. Because the data from this study would be more subjective

(students' perceptions of social presence) an experimental approach was not

adopted. Instead, the new features were included in the prototype

conferencing system from the start of the course. Additional qualitative data

was gathered from students, asking for their views on online communication

and online community in relation to the CMC features which were being

evaluated.

Chapters 3 to 5 give a detailed account of the research. Chapter 3 discusses

the first stage of the research: interviews and observations with students,

tutors and teachers. Chapters 4 and 5 discuss the second stage: prototyping

and evaluation. The first prototyping study, which investigated overload, is

presented in Chapter 4. The second prototyping study, which investigated

social presence, is presented in Chapter 5.

Chapter 3

User interviews and observations

This chapter reports on the first stage of the research, which aimed to gain input from students and teachers on how educational CMC systems could be improved to support learning more effectively. The objective was to ascertain the views of learners and teachers on:

- the benefits and problems of CMC in education;

- aspects of CMC systems which they found helpful and unhelpful;

- possible improvements to CMC systems for education.

Three user-groups were interviewed and observed:

- OU students (discussed in Section 1 below);

- OU tutors (discussed in Section 2);

- teachers at other universities who used CMC with their students (discussed in Section 3).

Section 4 draws overall conclusions for the next stage of the research.

1. Interviews with OU students

Interviews and observations were carried out with OU students taking the course T209 *Information and communication technologies: people and interactions*. This is a Level 2 course worth 60 CATS points. It is studied part-time, at a distance, over a period of about 9 months. As in most OU courses, students are members of a local tutor-group, with a group tutor.

T209 uses CMC as an integral part of students' learning. Students use the

FirstClass computer conferencing system for several different purposes:

- peer and tutor support in their local tutor-group (15-20 students);

- group working in small project teams (4-6 students);

- peer support in whole-cohort conferences (potentially over a

  thousand students).

Figure 3.1 shows an example of the FirstClass 'Desktop' window, as

provided by the client software (there is also a web interface to FirstClass,

which provides the basic facilities). The icons shown in the figure represent

the different conferences, together with the FirstClass email and calendar

facilities. Clicking on a conference icon will take the user into that

conference, in order to read and write messages.
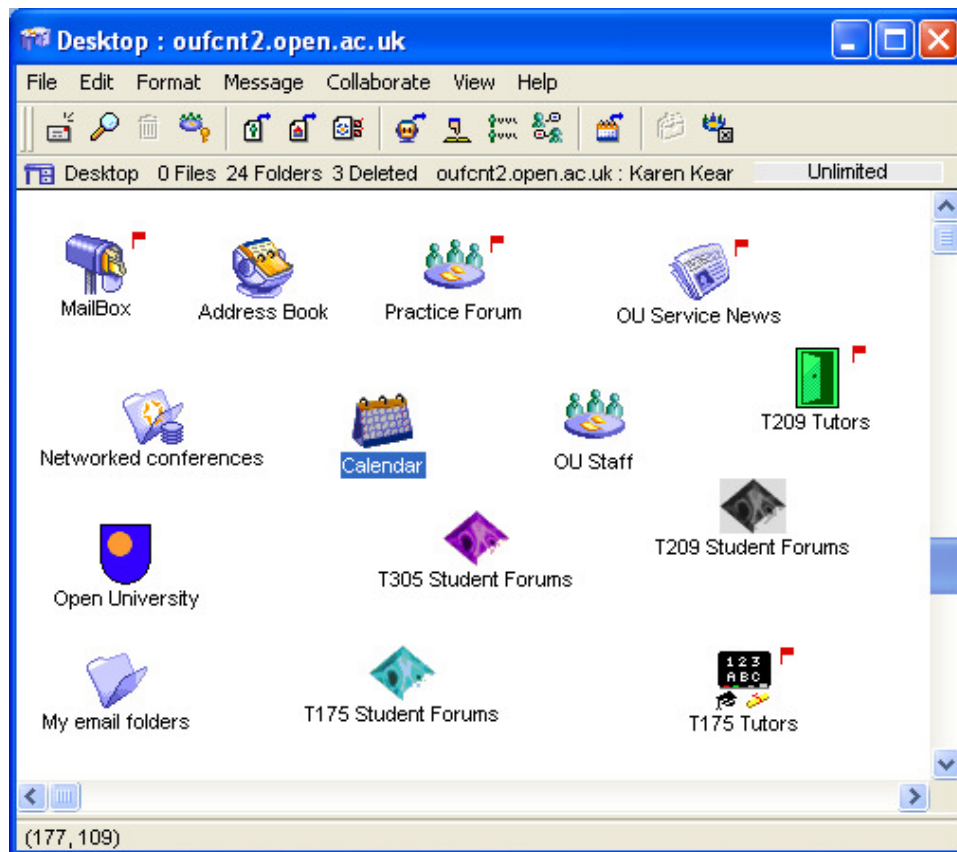
Figure 3.1 A FirstClass 'Desktop' showing icons for different conferences

Each tutor-group for T209 has its own FirstClass conference, moderated by the tutor. For part of the course, tutor-groups are further divided into project teams where they undertake an assessed group project, with each team having its own sub-conference. A suite of conferences is also provided for the course cohort as a whole (accessed via the 'T209 Student Forums' icon shown in Figure 3.1) These conferences are moderated by OU members of staff or experienced course tutors. The main course conference is read-only and is used to provide notices to students. It also contains optional sub-conferences in which students can ask questions, have discussions, help each other, and socialise.

Figure 3.2 shows the whole-cohort conference for Module 4 (which is when students undertake the group project). The bottom part of the figure shows messages in the main Module 4 conference, grouped into threads (users' surnames have been replaced by asterisks). The top part of the figure shows icons for further sub-conferences on the different topics in the module.
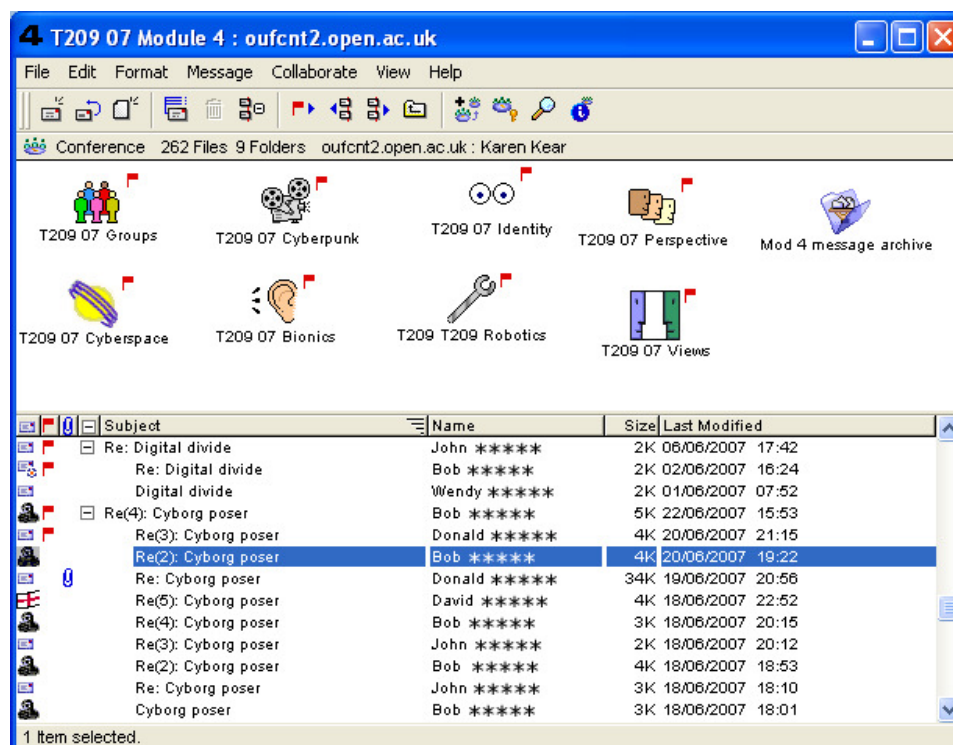
Figure 3.2 The FirstClass conference for T209 Module 4, showing messages and sub-conferences

Given the wide range of uses of CMC in T209, the course seemed likely to provide a good context for the interviews with students.

1.1 Method used for interviews with students

Recruiting the students

Recruiting students for the research proved to be difficult. The most obvious method would have been via an invitation in one of the whole-cohort conferences. However, this would have introduced bias, because the

students who use these conferences are the more active and keen CMC users. The methods of recruitment which were most fruitful were asking for volunteers at an OU 'course choice fair' and asking local tutors to extend invitations to their students. These methods would also have resulted in some degree of bias, because they relied on students volunteering to take part in the research.

The interviews

The interviews were carried out either during the later stages of the course or just after students had completed their end-of-course assessment. By this stage all students had experienced collaborative working in their tutor groups and had taken part in a group project supported via FirstClass. Many students had also used the national course conferences.

Ten students were interviewed, using three formats of interview:

- a focus group;

- individual face-to-face interviews;

- individual telephone interviews.

Table 3.1 lists the interviewees and their tutor-groups, giving the interview format used in each case. Although there was a gender balance overall among the interviewees, most of the individual interviews were with female students. This was because more female students volunteered to be interviewed.

Interviewee(s)	Tutor-group	Interview format
Students 1-5 (4 male, 1 female)	A	Focus group
Student 6 (female)	B	Face-to-face
Student 7 (female)	C	Telephone
Student 8 (female)	D	Telephone
Student 9 (male)	D	Face-to-face
Student 10 (female)	B	Face-to-face

Table 3.1   Interviewees and interview format used

The focus group method was of particular interest when planning the research because it could encourage the 'brainstorming' needed to generate ideas for new and better CMC features. But, given the difficulties of recruiting students, it seemed unlikely that a time and place could be found to suit enough student volunteers. When it became clear that a group of students were willing to stay for a short time after one of their tutorials, this seemed a good opportunity to use a shortened version of the focus group format (approximately 30 minutes, rather than the typical focus group duration of up to 2 hours). Four students had volunteered, but in the event five stayed on.

Three individual, face-to-face interviews were carried out. Two of these took place at the OU's central site. In one case this was because the student worked on site, and it was more convenient for her to be interviewed at work. In the other case, the student lived over an hour distant but happened to be working temporarily in Milton Keynes. The third face-to-face interview was carried out in the student's home. The three individual, face-to-face interviews were each followed by a short observation. In each case the student demonstrated how they used the system, and talked through their

online activities, responding to questions where clarification was necessary. The two telephone interviews were both carried out in the evening. Each student was phoned at a pre-arranged time which was convenient to them.

The interview schedule

In all cases, the same interview schedule (set of questions) was used. This was designed to be fairly general, in order to provide opportunities for students to give their thoughts and suggestions. A draft interview schedule was written and tested on a colleague. On the basis of this experience, questions which did not seem useful were removed and the wording was modified to make it more suitable for a spoken interaction. The schedule was also shortened so that the interview would take less than 40 minutes.

The final interview schedule is given in Appendix 3A. It starts with factual questions about the amount of time students spent using FirstClass. These questions were designed to ease the students into the interview, as well as providing useful information about what kind of CMC user each student was. There follow questions about:

- the interviewee's experience of other systems;

- problems and benefits of CMC;

- how easy the FirstClass system was to use;

- features which interviewees liked and disliked;

- features which would be useful in the 'national' (whole cohort) conferences;

- features which would be useful for small-group work;

- what the interviewee might suggest to system designers.

Conducting the interviews

At the beginning of each interview the student was thanked for volunteering, the purpose of the interview in the context of the research was explained, and assurances of confidentiality were given. The interviewee was told that the questions were quite general, which meant that their ideas and suggestions might arise at different points in the interview, and that this was quite acceptable. They were told that there would be pauses during the interview while notes were made. For the face-to-face interviews the students were asked for permission to make an audio recording of the interview, and all the interviewees gave their permission.

The interviews took between 20 and 40 minutes each. For each interview, notes were made on a copy of the interview schedule, using text and mind-map notation. It was found that interviewees often provided additional answers to an earlier question while responding to a later one; a decision was made to note all students' comments under the current question, even if the comments were actually responses to an earlier one.

When conducting the individual interviews, the aim was to create a relaxed and open atmosphere so that the students produced as many of their own ideas as possible, rather than being worried if they could not think of much to say in response to a particular question. It was important to create comfortable intervals when students could 'incubate' their thoughts (for example, by saying "I am just noting down that you said ...").

In the focus group setting the main issue was trying to encourage equal input from all members of the group. There was a tendency for one or two group members to dominate, and others to have difficulty finding a gap in the discussion to give their ideas. It became clear that tighter facilitation was required, in order to create a better balance of inputs. However, in other respects the focus group format fulfilled its promise. The students triggered ideas for each other, and built on each others' suggestions.

Observation work

It would have been valuable to carry out a naturalistic observation in connection with each of the individual, face-to-face interviews. This could have revealed how students use FirstClass without any interference. However, in the present context it was not possible to carry out a truly naturalistic observation. Two of the interviews were carried out at the OU's central office, rather than in the student's normal place of study, so these students' use of FirstClass would not have been representative of their activities while they were studying. Moreover, students did not seem comfortable using the system for real learning tasks while being observed.

After each of the individual, face-to-face interviews the student was asked to log on to FirstClass, and show what they would normally do. The observations therefore took the form of a demonstration by the student of their typical sequence of activities, and features which they wanted to comment on. The student was asked questions when it was necessary to clarify what was being said or demonstrated. This style of observation is

more in the nature of a contextual inquiry approach (Holzblatt & Jones, 1993).

The effectiveness of the observations varied in terms of data gathering. For the first face-to-face interview, the observation was rather brief and did not provide much further information. For the second, the observation was mainly used by the student to demonstrate points already made in the interview. In the third case (where the interview took place in the student's home) the observation was more fruitful than the interview itself. During the interview this student had not made many points, but during the observation she commented on a number of different CMC features. The fact that this observation was the most valuable of the three suggests that it important to carry out observation work in the user's place of work or study.

Data analysis

Notes from each interview were typed into copies of the interview schedule, followed by notes on any observation. The analysis process which followed was iterative, and several objectives were borne in mind throughout:

- to draw out the major ideas for improved CMC system design for learning;

- to ensure that all the students' inputs were considered;

- to minimise the effects of bias or preconceptions.

After reading through all the interview records, a summary was written of the main points which emerged (Appendix 3B). A spreadsheet was then created with general topic areas which roughly corresponded to the topics

covered in the interviews, and with a column for each interviewee (see Appendix 3C). Summaries of each student's comments were entered in their own column against the relevant topic. The focus group data was entered in a single column which included the comments from all those present.

An affinity diagram was then created. This is a diagram structurally similar to a concept map which is used in system design to indicate how ideas group together (Preece et al., 2002, p. 304; Holzblatt & Jones, p. 203). The initial diagram was made by cutting up the notes from the spreadsheet and pasting them on to the diagram, grouped roughly by topic. This diagram was used as a basis for: refining the summary of findings; adding more detail; indicating how many students had mentioned each topic; checking that nothing important had been omitted; and extracting themes (see Sections 1.2 and 1.3 below). Appendix 3D shows extracts from the final affinity diagram for the main topics which emerged. The detailed findings are discussed below.

1.2 Results of interviews with students

Usage

The average number of hours per week spent on different conferencing activities varied considerably. The shortest time per week was about 30 minutes and three of the students spent 5 or more hours per week. This is in the context of a total expected study time of 16 hours per week. It is not clear whether the time spent on CMC is an addition or a replacement for time spent on other study activities.

Four of the students spent most of their CMC time in the whole-cohort conferences. Several students spent between one and three hours per week

in these conferences, but two students did not use the whole-cohort conferences at all. The time per week spent in the project group conference during the 7-week period of group work ranged from 1 hour to 7 hours. The students had all used other CMC systems to some extent. Most had used versions of Outlook, Hotmail or MSN, and some had used Lotus Notes or Yahoo.

Problems in conferences

Many students highlighted the problem of information overload in the national conferences. This was expressed in terms of "takes too much time" or "too many messages". A related problem was deciding which messages to read. There was a view that there were too many "junk" or repetitious messages. This was characterised as "a poor signal to noise ratio" by one student. Another student indicated that there were useful tips in the national conferences "so it's worth reading through". However, students said they had difficulty judging from the message title whether to read a message, partly because of 'topic drift', where the subject of a discussion thread changes over time. One student said she had problems "sorting the wheat from the chaff".

Other problems were mentioned relating to the tone of some messages, which one student described as "awful". Another student even characterised some messages as "abuse". Related problems were that people can dominate the conferences and that messages can be easily misconstrued. Most students said they rarely or never posted messages to the national conferences, and two students explained that others always seemed to have

"said it already" or "were ahead". Another expressed concern about the possibility of an unpleasant response.

Some points were made which related to working in smaller conferences. An issue raised by two students was the time lag between posting a message and getting a response. Another point raised by two students was the difficulty of contacting other students if they did not respond to messages - or did not even log on. This was seen as a particular problem for group work.

Ease of use

All students said that the FirstClass client software was easy to use. They also said that FirstClass had been easy to learn. The general look-and-feel was approved by most students, and the icons were highlighted as a good interface feature by several. However, students also said that setting up the system initially had been difficult. One student said that the user interface needs to be better for novices, and another pointed out some of the words used in the interface (e.g. "pattern" and "local"/"remote") which she did not understand. Two students reported problems with navigation and finding things. There was a feeling that useful conferences were "buried". One student pointed out that he probably only used 10% of the functionality. Another swept his mouse over the icon bar in the FirstClass client and said "I don't know what half of these do". Many students had used the web interface to FirstClass, and this was considered to be difficult and frustrating. Students were not sure how to carry out certain operations (e.g.

sorting messages) using this interface, and were uncertain as to whether the facilities were even available.

Helpful features

Students mentioned a number of features of FirstClass which they found valuable. The History feature, which shows who has read a message and when, was mentioned as useful by four students. It was seen as particularly valuable when carrying out group work, to find out whether a group member was reading the conference messages even if they had not replied. Résumés (self-introductions entered by users) were mentioned as helpful by three students, one of whom said she is "disappointed if someone hasn't got one." The Calendar facility was also mentioned as useful by three students. One student's tutor had created a group calendar with dates of tutorials etc. This was seen as a useful addition to the printed course calendar.

Searching was highlighted as useful by two students, though one reported that she often forgets to use it. Sorting was mentioned by two students, particularly sorting by thread. The threading of messages was highlighted as a valuable feature by one student, and one student reported that she used the next-in-thread feature to work through the national conferences. The highlight-and-reply feature for easy quoting of part of a message was mentioned by two students. Three students mentioned the "Who's online?" feature, which provides a list of all users currently logged into FirstClass. This was seen as particularly useful for small groups, and one student described an impromptu meeting, held because "we knew we were there".

Two students said that sub-conferences were a helpful feature for organisation. One student, showing her tutor-group conference which contained a number of sub-conferences, described it as "nicely broken down". Another student reported using personal folders to organise her mail messages. The ability to change certain aspects of FirstClass to your own preferences was mentioned as a positive aspect by one student, and was raised in relation to font size by another.

Dislikes

Students mentioned a range of aspects of FirstClass which they disliked. Three students described problems where mail messages had gone to the wrong student, or to the right student but on the wrong server. This arose because the directory facility did not give a clear indication of which account name to choose. Two students commented negatively on pop-up system messages. During an observation with one of the students, a system message opened up and the student said "That's annoying". Three students also said they disliked the fact that FirstClass (or the student's ISP) "kicks you off" sometimes. Another problem mentioned by two students was that mail messages expire after a certain time. Two students described problems with the web interface, in particular when moving between reading and replying to messages, and scanning through the message list.

Desired features

Students suggested a number of features which would be helpful to them. Some of these were extensions to the FirstClass facilities for synchronous, rather than asynchronous, communication. Four students suggested

variations on a "buddies" facility, which informs users when selected people are online. Students said that a version which does this for members of a tutor-group or project group would be particularly useful, as it would allow them to hold an instant chat just within that group. One student suggested that static or web-cam images of "buddies" could open in a corner of the screen when people came online. Two other students also mentioned the possibility of web-cam interaction, and two suggested voice interaction. Students also said that an easy way to save the transcript of a Chat session is needed.

Two students mentioned features for finding out more about individual users. In the whole-cohort conferences they would have liked to know who was a student and who was a tutor, and what courses people had studied. Three students said they would like the system to require or prompt users to complete a résumé when they first log on. Another student suggested that there should be an icon indicating whether or not a user has a résumé.

A facility to store mail messages locally was suggested by two students (in response to the problem of messages expiring). Students also indicated that FirstClass needs to handle email addressing better. One suggestion was that you could click on the person's name and an empty mail message to them would open.

To aid navigation, one student suggested a tree structure for conferences, with drill-down facilities. Another student suggested "pointers to useful things". The general view from the focus group students was that users

should be presented with an individualised portal based on the courses they were studying. The students wanted FirstClass to be personalised and personalisable.

1.3 Discussion of interviews with students

The interviews and observations with students revealed a great deal of information about their needs from CMC systems. A number of themes emerged, as discussed below.

Information overload

When working in large conferences, many students are overwhelmed by the number of messages. Although some of the messages are very helpful, many are not particularly useful. It takes too long to read through all the messages, and it is difficult to differentiate those that are valuable from those that are not. This is partly because the message title is not always a good indicator of the content of the message. Because there are so many messages, arriving so quickly, students are discouraged from writing to the conference.

These problems are well known to educators using computer conferencing on large courses (Hiltz & Turoff, 1985; Salmon, 2002, p. 98; Rennie & Mason, 2004, p. 11). One solution is to break the student cohort into smaller groupings. However this is sometimes not well received by students, who want to be in touch with all the other students on the course (Weller & Robinson, 2001). Another approach is to break the conferences up into sub-conferences on different topics.

Good threading tools can help by clearly separating the messages into different discussions, and by indicating where these discussions branch into sub-discussions. FirstClass has threading facilities which students seem to value, but the facilities could be improved. Sorting and searching tools are also useful when dealing with large conferences. The ability to sort messages by thread, date or author is helpful.

The problem of overload also arises in relation to the number of conferences. There are too many, and useful ones cannot be found easily. The students presented this as a navigation problem - how can they get to the conferences which are of interest to them? One suggestion was that FirstClass should present each student with a personal portal, showing only those conferences which are directly relevant to them. Other conferences could be available, but hidden.

Social Presence

Many issues raised by the students relate to the idea of social presence. Students need to feel that they are communicating with real people, even though the communication is via a computer. However, text-based communication is often seen as impersonal. This could partly explain the problem of 'abuse' which can arise in conferences. If the environment feels anonymous, there is little to inhibit students from posting ill-considered messages.

Students need to know something about the people they are communicating with, so that they can gain a sense of a real person behind the screen. This explains why a number of the students valued the FirstClass résumé facility;

it gave them a chance to learn about their fellow students. Some students suggested that résumés should be compulsory, or that users should be prompted to write a résumé when they first log on. Another feature for enhancing the sense of presence would be to encourage users to choose or create a graphic or icon to represent them. This could appear beside their name in lists of messages. FirstClass has this facility, and some students already use it.

Synchronous facilities

Social presence can be enhanced by the use of synchronous facilities (McInnerney & Roberts, 2004), and these formed a strong theme from the students. Some students found the FirstClass Chat tool helpful and motivating when carrying out group work. However there are problems with Chat because the overlapping conversations can become confusing, and the experience can be frustrating if you are not a fast typist. Another issue is that there is not normally a record of the Chat session. This can be seen as an advantage, because it encourages spontaneity, but if Chat is to be used for collaborative tasks and decision-making an option is needed to save a transcript. This will provide a textual record of the session and allow any absent group members to follow the discussions.

When carrying out group work, some students use the normal FirstClass conference facilities, but try to have all members of the group online together. This speeds up decision-making considerably. It also avoids the frustration, when communicating asynchronously, caused by the delay between submitting a message and getting a response. This frustration can

also be alleviated somewhat by the History facility, which at least tells students whether their message has been read.

A facility which many students wanted was an alert when certain people came online, as in an instant messaging system. Students would like to be told when members of a certain group (their friends, their project group or their tutor group) log on. This would enable them to make contact via Chat, email or in a conference. As more users gain access to audio and video facilities, and have broadband communication links, multimedia modes of synchronous communication could also be of value. However, for distance learning we need to bear in mind that it is difficult for all students in a group to get together online at a particular time. This means that courses should not be too reliant on synchronous communication.

Usability and control

All the students described the FirstClass client software as easy to use, and many were able to learn how to use it without referring to the instructions or help. Students liked the 'desktop' idea and the use of icons. In contrast, the web interface to FirstClass was seen as difficult to use, and students pointed out a number of aspects of the user interface which caused them problems.

One aspect of the FirstClass client interface which students liked was the ability to customise it. For example, they liked to be able to decide how messages should be listed and what font should be used for their own messages. Students liked the idea of being able to personalise the system - being in control of how it behaves. They disliked situations where the system seemed to be taking control away from the user. For example,

particular dislikes were system messages which auto-opened and mail messages which expired after a certain time.

1.4 Conclusions from interviews with students

The interviews and observations with students aimed to discover which aspects of CMC systems learners found helpful and unhelpful, and to gain ideas for new features which are needed. The study revealed two main aspects which are particularly important to the students:

- the problem of large numbers of messages causing information overload;

- the need to enhance social presence, including the need for synchronous communication tools.

The FirstClass system has some facilities which address these issues, but the students' comments indicated that these facilities could be enhanced, and new features provided. The interviews also identified other aspects of CMC systems which are important. Ease of use is an obvious factor; perhaps less obvious is the need for users to feel that they are in control of the system, and that the system can be personalised.

2. Interviews with OU tutors

Having obtained the views of OU students, the next step in the research was to interview OU tutors who used CMC (again the FirstClass conferencing system) to support their students. These interviews were supplemented by observations of tutors using FirstClass. The objective was to gain tutors' perceptions of issues and system features that affected their students' learning and their own teaching. Interviewing tutors added the perspective of a different user group, and because tutors were recruited from a range of courses, also widened the context of the research.

2.1 Method used for interviews with tutors

The interviewees

The ten tutors interviewed (5 men and 5 women) were all employed on Technology Faculty courses. They were recruited by via contacts with other members of the Faculty. Half of the tutors were working on, or had worked on, several different courses, all of which used FirstClass conferencing. Table 3.2 lists the tutors and the courses they worked on. Courses B and C are Level 1 courses; courses A and G are at Level 2; courses D, E and F are at Level 3. Two of the tutors, who were in the same location and worked on the same course, were interviewed together.

Tutor	Course
Tutor 1 (female)	Course A
Tutor 2 (male)	Course B
Tutor 3 (female)	Course B, Course C
Tutor 4 (female)	Course B, Course C
Tutor 5 (male)	Course A, Course B, Course C
Tutor 6 (female)	Course B, Course D, Course E
Tutor 7 (male)	Course B, Course F
Tutor 8 (male)	Course G
Tutors 9 & 10 (1 male, 1 female)	Course G

Table 3.2   Tutors interviewed and the courses they tutored

For each course, the tutor was responsible for the support of a group of 15-
20 students. The online element of this support was carried out primarily via
a FirstClass conference for members of the tutor group and the tutor. The
tutor acted as moderator of this conference. In most cases both students and
tutors also had access to other conferences. For a typical course there would
be a whole-cohort conference for students and possibly a conference for all
the tutors on the course.

The interviews and observations

As a result of experience from the student interviews, all the tutor interviews
and observations were carried out in the tutors' homes or workplaces -
where they normally did their tutoring work. This provided an authentic
context, and allowed for observation of tutors using the system. The
interviews and observations varied in duration, depending on how much the
interviewees wished to say, but typically an interview lasted for about an
hour and an observation for about half an hour. The interviews took a semi-
structured form, with a fixed set of questions (see Appendix 3E), but

interviewees were encouraged to answer freely, and not to restrict their comments to any particular question. The questions were based on those used for the student interviews, but tailored to the tutor role, and with the addition of two questions on the value of CMC for education, and what an ideal educational CMC system might be like.

All but one of the interviews were followed by an observation of the tutor using the system. The exception (the joint interview with tutors 9 and 10) was due to a failure of the Open University network at the time of the interview. The observations consisted largely of tutors demonstrating and commenting on how they used the system, rather than actually doing any online tutoring. This was probably because tutors considered their interactions with their students to be private, or because they needed more time to reflect on how to proceed with their online work.

For each interview and observation, hand-written notes were made on a copy of the interview transcript and were typed up after the interview. An audio recording of the interview was also made (with the interviewee's permission).

Data analysis

The notes from the interviews were loaded into a dataset for analysis using the *Atlas-ti* software package. This software facilitates the coding of qualitative data to highlight emergent themes. Significant sentences or paragraphs are identified as 'quotations' and assigned 'codes' which indicate topics or issues to which they relate. A quotation can be associated with several codes and a code will typically be associated with several

quotations. For example a code "searching" might be associated with one tutor's comment that searching is useful, and another's comment that it is not easy to carry out. Codes are assigned to new quotations as the analysis progresses. New codes can be created as needed while working through the data, consistent with a grounded approach. Codes can be grouped into 'families' as a further step in analysing the data.

The data was analysed within the *Atlas-ti* software by creating quotations and codes as described above. On completing the analysis of the interview notes, over 600 quotations had been defined (the number per interview ranged from 41 to 119) and over 70 codes had been created. The final list of codes, together with the number of quotations from each interview for each code, can be found in Appendix 3F.

2.2 Results of interviews with tutors

Quantity of messages

Tutors felt that there were too many messages to read, and that this was off-putting, both to students and to themselves. One tutor described the problem as 'death by red flags' because FirstClass shows a red flag icon beside messages which the user has not yet read. Tutors felt that seeing all the unread messages could have a negative effect on students. They thought that many students would not read conferences where there were too many messages, but would simply withdraw from them. Tutors reported that they themselves avoid such 'crowded' conferences. The word 'off-putting' was used often by tutors in relation to the number of messages. One aspect of this was the variation between students who post a large number of

messages and those who do not have time to be so active online. It was felt that this imbalance is discouraging to both types of student. However, tutors pointed out that the scale of the problem varied, depending on how often the user logged on, and that good search facilities could alleviate the problem to some extent.

Tutors discussed the difficulties for students of judging which messages to read and which to ignore. They pointed out that the message title should help in making this judgement, but often does not because the same default title is used for all messages in a thread. Tutors suggested that defining a new title for each message might help. A preview facility, whereby a user could see the first few lines of a message, was also suggested - or just a very quick way to open a message. One suggestion was that tutors should have a facility for flagging important messages. This would be useful when posting announcements or important feedback to all their students. The facility to reset the status of a message to 'unread' if it needs to be reviewed later was seen as useful.

Threading was highlighted as a useful tool for deciding which messages to read. Threading was seen as having two main benefits:

- grouping together messages which are on the same topic;

- allowing users to reply to specific messages and to follow the conversational structure when reading messages.

Tutors who had used an earlier Open University conferencing system (see Kear, 2001) seemed to put more stress on the second aspect. They

considered that the threading mechanisms in FirstClass were not as good as those in the earlier system. One tutor suggested that some kind of clickable map showing the links between messages could be useful, though possibly more so for tutors than for students.

All tutors thought it was important to be able to group related messages together, and a suggested system improvement was to display each thread in a separate window. Not all tutors displayed their messages grouped by thread, however; some displayed them chronologically. It was noted that threading is not always successful in categorising messages because threads can go off-topic, and messages on the same topic may be created in different threads.

Making contact

Tutors felt that CMC helps to alleviate feelings of isolation - it "overcomes the distance", and one tutor reported that the tutors' conference had given him a sense of belonging. Tutors said that CMC can help maintain good contact between student and tutor. The view was also expressed that students helping others and being helped by others is an important factor in retention of students. But the point was also made that some students prefer to be at a distance.

Tutors felt that it was important for students to know something about each other. They considered the FirstClass 'Résumé' facility to be useful for this purpose, and wished that more students used it. One tutor had created a sub-conference where students could post their contact information (for setting

up self-help groups etc.). He suggested that an equivalent facility could be provided by the system.

Tutors reported that it could be difficult to get students to engage in the conference, particularly at the start of the course. It was seen as important to establish a culture of participation right from the start, otherwise there could be a vicious circle of inactivity. Several tutors mentioned that face-to-face meetings seemed to encourage engagement in the conferences and reinvigorate them if they were flagging. The view was that involvement in face-to-face events and involvement online supported each other.

Tutors thought that quieter students could be daunted by the public aspect of conferencing: by the quantity and quality of messages (see Wegerif, 1998). They also highlighted difficulties for students with interpreting the tone of some messages, and said that there could be problems with students 'griping', upsetting each other, or even resorted to 'flaming'. These problems mainly occurred in the large national conferences, but also arose sometimes in tutor-group conferences. Tutors felt that students could be easily put off by what they perceived as bragging or criticism in others' messages. The point was made that students' feelings and relationships affect whether and how they engage online. It was felt that because students were only able to 'meet' through the textual medium, special care needed to be paid to issues of 'netiquette'.

Synchronous communication

Tutors felt that the FirstClass synchronous chat facility was useful, either for a tutor-group or a project group, and either with or without the tutor. The

'Tutor-group chat' facility was preferred over the more general chat tool, for several reasons: it is for a particular tutor-group; it shows which students in the group are online; and students can join the chat themselves, rather than needing to be invited. However, tutors also identified problems with synchronous chat. They pointed out that arranging a time for a chat session was difficult and that the dialogue in a chat session can become confusing. It was suggested that an improved interface is needed, where messages or conversations can be seen in parallel. Tutors also thought that it was useful to keep a transcript of a chat session. The FirstClass 'Who's online' facility was seen as useful by several tutors, as was the similar facility within the tutor-group chat. It was suggested that students could see who was around from their tutor-group or project-group and invite them for a chat. This serendipitous contact was seen as valuable.

A number of tutors mentioned the possibilities of video or audio conferencing. Most tutors were aware of the OU's *Lyceum* audio-conferencing system, and some had used it. *Netmeetings* and *CUSeeme* video-conferencing were also mentioned. Tutors saw value in synchronous voice communications, and possibly in video-conferencing or webcams. The benefits discussed were: overcoming time lags; including tone of voice or body language; encouraging and easing future asynchronous communication.

Tutors were particularly interested in synchronous collaboration tools such as shared documents, diagrams, whiteboards and concept maps. They considered that there could be significant benefits in a group using voice

communication (or possibly text chat) to work on a shared resource or to do brainstorming or joint mind-mapping exercises. Tutors suggested that these facilities could be used to provide lively online tutorials or to help students carry out group work.

Monitoring activity

Tutors mentioned a number of ways in which they needed to use FirstClass for managing their online teaching. One major concern was in getting students up and running at the beginning of the course. This was seen as both a technical and a social issue. Although tutors all felt that FirstClass itself was easy to learn and to use, many thought that the 'startup processes' such as installing the software, finding the right conferences and posting a message, were daunting for students. Tutors found that they needed to do a lot of checking initially to see whether students had managed to get online and find the tutor-group conference. To do this they used a combination of different methods: looking at conference permissions to see who should be there; looking at the FirstClass user information to see when a student last logged on; looking at other University systems to find information about a student (e.g. the student's personal email address). It was pointed out that there is no easy way to contact a student who has not logged on.

Tutors reported that as the course progressed there were other occasions when they needed to check on student activity. For example, they might notice that a student was not posting messages to the conference. Tutors could then use the FirstClass 'History' facility to see whether the student was reading messages, but not writing them. They could also check whether

the student was logging on at all. If a course included assessed group
activities, tutors needed to judge the extent of each student's participation:
to see how many messages they contributed and when, as well as judging
the quality of interaction. Tutors suggested that the system could provide
summary information on participation. This data could be provided
automatically for all members of the tutor-group, rather than the tutor having
to request it for each individual.

Managing conferences

Another concern of tutors was the management of their tutor-group
conference. This involved creating a suitable set of sub-conferences, either
right from the start of the course or as the need arose. It was clear that tutors
made efforts to create a well-organised, welcoming and friendly set of
conferences. A number of tutors used features of the system to create an
attractive learning environment. They chose conference names and icons
carefully and used background graphics, fonts and colours to enliven the
conferences and their own messages. Tutors pointed out the importance of
meaningful conference names and icons, so that students know the purpose
of each conference. A desire was expressed for more flexibility in the
naming of conferences and in the choice of icons which could be used.
Some tutors would have liked to create their own icons, and also to add
other personalising features to their conferences.

Tutors stressed that users need to know what conferences exist within the
system, and how to find them. One suggestion was some kind of 'map'
showing the conference structure. For their own purposes some tutors take a

step towards this by grouping the icons of related conferences together on their FirstClass 'desktop'. One suggestion was a conference 'favourites' facility, whereby users could keep a list of frequently-used conferences.

Tutors said that using sub-conferences helped to break down and organise the discussion. However, it was pointed out that consideration needs to be given to how many sub-conferences to create: with small numbers of users and messages, sub-conferences may not be needed, and can lead to confusion, with students simply carrying on their conversation in the main conference. Tutors said that important or useful messages may be lost or never read if there are too many conferences and the student does not know which ones to look in. One strategy reported was to put important messages in the top-level conference. This was described by one tutor as "on the front door".

Tutors mentioned another role of sub-conferences, which is to break students up into smaller groups. Tutors made use of the FirstClass 'permissions' facility to allocate students to different conferences for small-group work and to create read-only conferences for notices. They also used permissions to share conference moderating, with two or more tutors giving each other moderator privileges for their conferences. Then if one tutor was away, another could keep an eye on their conferences. Tutors also valued learning from each other by looking into each others' conferences.

Tutors also needed to manage the messages within their tutor-group conferences. If a student posted a message in the wrong place, the tutor

would need to move the message. Forwarding a copy of a message to another conference was also seen as useful (for example, forwarding a message from a national course conference into the tutor group conference). Tutors also needed to archive old messages, so that the conferences did not get too crowded. They would do this by creating one or more 'archive' sub-conferences, and periodically moving messages across. A need was expressed for an automatic way of doing this.

Usability

Tutors gave a range of comments on usability aspects of FirstClass, and many of these comments were similar to those made by students. Tutors felt that FirstClass was easy to use and that the interface was straightforward and had a good 'feel'. In common with students, tutors liked the use of icons, but did not always know what a given tool icon represented, so they appreciated the 'icon rollover' feature explaining the purpose of each tool. One tutor commented "There are probably some features I don't even know are there".

Aspects which tutors highlighted as unsatisfactory included (as mentioned by students) auto-opening messages, confusion with mail addressing and occasions when they were 'kicked off' the system. Tutors also mentioned other features, such as the fact that each message opens in a new window, resulting in a large number of windows on the screen. They mentioned the FirstClass off-line reader as a useful facility, but one which was "tricky" to use.

2.3 Discussion of interviews with tutors

The major themes from the tutor interviews and observations are discussed below. These themes are:

- information overload;

- social presence;

- synchronous communication;

- managing a tutor-group.

Information overload

Tutors are concerned about the effect on their students of being faced with too many messages and conferences. This is off-putting and can cause students to withdraw from the conferences. In particular, when students are faced with large numbers of unread messages, they find it difficult to judge which ones to read. Better use of message titles might help in this respect. A facility for tutors to flag important messages to students might also be of value, as would a personal tool to mark a message 'for later review'.

Tutors consider threading to be an important facility when dealing with large numbers of messages, because it allows messages to be grouped together, and conversations to be followed. However, threads do not always work correctly for these purposes because users sometimes post messages in the wrong threads. Displaying a thread in its own window, separate from the other threads, might be helpful.

Social presence

Tutors feel that conferencing can help overcome the isolation which some distance learners experience. Students can use the conferences to communicate more easily with the tutor and with each other, and to gain and offer help, which contributes to keeping students on the course. Tutors are conscious that students' relationships and feelings affect their online work. Students are put off by the tone of some conference messages, for instance those that are critical, 'griping' or which seem to be bragging. Some students are daunted by the public nature of conferencing and think they cannot match the high quality of others' messages. To alleviate these problems it is important that students get to know each other, so tutors encourage students to post messages introducing themselves. The FirstClass Résumé facility is also useful for this purpose, and tutors wish more students would use it.

Synchronous communication

Synchronous chat can be useful within a tutor-group or project group. Synchronous communication does not suffer from the time lags between messages which students find frustrating in asynchronous communication. However chat sessions can be confusing, with messages getting out of step. It is possible that an improved user interface could alleviate this problem. A facility for saving a transcript of a chat session is also needed, so that absent group members can see what has been discussed. It is often difficult for students to arrange a time when all members of a group can be online, so a feature indicating who is online from a given group would be useful. This

would encourage serendipitous synchronous communication among students, which could be of value.

Other synchronous communication tools such as audio- or video-conferencing might also be useful. These have the benefit of including 'cues' from tone of voice or body language (Sproull & Keisler, 1991). Tutors are also interested in facilities which would allow students to work together synchronously on a shared resource. Examples include shared mind-mapping or brainstorming environments, and collaborative documents.

Managing a tutor group

There are a number of online tasks that tutors need to carry out in order to support their students and manage their tutor-group. The first of these tasks is to create a well-structured and welcoming set of conferences for the tutor-group. This involves dividing the tutor-group conference into a suitable set of sub-conferences, and choosing conference names, icons and other visual devices. Tutors want to create an environment with a particular 'identity', so that students gain a sense of belonging. In order to do this, they need facilities to control the visual appearance of their conferences and messages (e.g. fonts and colours, icons, background graphics).

Having set up their conferences, tutors need to make sure that students can all get started in the online environment. This requires checking that students are registered and have found their way to the tutor group conference. If students are absent from the conference, a mechanism is

needed for making contact with them. Currently, tasks such as these require the use of a number of systems beyond the FirstClass environment.

As the course progresses, tutors need to continue this monitoring activity, to make sure students are engaged and participating. For example, they might check when a student last logged on, or whether they had read certain messages. In courses where online work forms part of the assessment, monitoring students' activity is particularly important, so facilities for gathering and collating information on participation levels would be useful. Tutors also need to carry out housekeeping tasks on their conferences, particularly archiving messages, so an automatic archiving facility would be helpful.

2.4 Conclusions from interviews with tutors

The themes which emerged from the interviews with tutors were very similar to those from the student interviews. This could be because tutors were partly speaking on behalf of their students, so they identified issues which they knew were significant for students. But tutors also mentioned aspects which they were concerned about for themselves, and these were often the same issues the student interviewees had highlighted.

Both groups were concerned about overload of messages and conferences. Both groups also focused on issues related to the social aspects of CMC, and felt that synchronous communication might be helpful. In addition, the tutors mentioned a number of issues related to managing their online work

with students. They needed to monitor participation, and they wanted to create a visually interesting and welcoming environment for their students.

3. Interviews with university teachers

The interviews reported so far were with students and staff of the Open University, who were all users of the FirstClass conferencing system. Moreover, they were all studying or teaching technology courses. In order to gain a broader perspective, interviews were also carried out with members of staff at other universities who used Virtual Learning Environments (VLEs) as part of their teaching. The aim was to discover:

- how these teachers used the communication elements of these systems;

- their perceptions of the benefits and problems;

- their ideas for improvements to the systems.

3.1 Method for interviews with university teachers

Interviewees

The main consideration in recruiting the interviewees was to encompass a range of different VLE systems. It was also important to ensure that potential interviewees were using the communication elements of VLEs, rather than using the systems solely to deliver materials to students. Interviewees were recruited via contacts with VLE support staff at different universities. The support staff recommended teachers who were active users of the communication facilities of their VLE. In most cases these were the 'early adopters' of communication technologies at their institution.

Six members of staff from four different universities agreed to be interviewed and observed (see Table 3.3). Each university used a different VLE: WebCT; Blackboard; Moodle; and an in-house VLE. Five of the interviewees were lecturers; one was the leader of his university's VLE support team and also taught staff development courses via the VLE. The subject specialisms of the lecturers included history, art, community studies and healthcare, and their students included undergraduates and postgraduates.

Interviewee	University	VLE
Eleanor	A	WebCT
Michael	A	WebCT
John	B	Moodle
Judith	B	Moodle
Mark	C	Blackboard
Henry	D	In-house VLE

Table 3.3   The interviewees (not their real names), their universities and VLEs

Interviews and observations

Each interview was carried out at the interviewee's institution, in their own office with their computer available for the observation element. Each interview, together with the observation, took between one and two hours. A semi-structured interviewing approach was used, based on a schedule of questions (see Appendix 3G). The questions covered:

- how the interviewee used the communication elements of the VLE as part of their teaching;

- what they liked and disliked about the VLE communication tools (and any other CMC systems they had used);

- what problems they or their students experienced;

- what system improvements they would like to see;

- their views on the educational value of teaching using the communication aspects of a VLE.

The interviewees also demonstrated aspects of their use of the system. In most cases this observation was carried out after the interview, but some interviewees preferred to show features as they answered the questions. For each interview, hand-written notes were made on a copy of the interview schedule and were typed up after the interview. An audio recording of the interview was also made (with the interviewee's permission).

Data analysis

The first step in the analysis was to read through the six sets of notes from the interviews and observations. Significant points were underlined on printed copies of the notes, with occasional jottings in the margins. The aim was to gain an overall impression of the interviews. A brief overview for each interview was then written (see Appendix 3H). This mentions: the context in which the interviewee worked; the way he or she used the VLE; and his or her main concerns.

The notes from the interviews were then loaded into the *Atlas-ti* qualitative analysis software package. As for the tutor interviews, the package was used to code multiple short segments (quotations) from the interview notes. The codes were words or phrases such as 'usability', 'active learning', 'time' etc. New codes were defined as needed while working through the data, and

existing codes assigned to new quotations. For example, the following extract from one interview was assigned the codes 'student attitudes' and 'assessment'.

> 'Barriers mean that if they had a choice they wouldn't do it. So the assessment makes them do it.'

A second stage of analysis was carried out using the audio recordings of the interviews. For each interview, the audio file was played while following the notes from the interview within the *Atlas-ti* package. This fulfilled two purposes: to ensure that the notes, and the coding of them, gave a true reflection of the interview; and to identify parts of the interview where it was valuable to report the exact words of the interviewee. Occasionally the audio revealed omissions from the notes, or the notes needed clarification. It was sometimes necessary to allocate additional quotations to existing codes, but it was not found necessary to create any new codes.

In total, over 400 quotations were defined (the number per interview ranged from 57 to 103) and nearly 50 codes created. The final list of codes, together with the number of quotations from each interview for each code, can be found in Appendix 3I.

3.2 Results of interviews with university teachers

Systems used

As mentioned, the main VLEs used were: WebCT (two interviewees); Blackboard (one interviewee); Moodle (two interviewees); an in-house VLE (one interviewee). However, three of the interviewees had experience of

VLEs or communication systems other than the one their institution was currently using. This was sometimes as a student themselves and sometimes because their department had used another system before their institution settled on a university-wide VLE. The other communication systems interviewees had used included WebBoard, Lotus Notes and FirstClass. The interviewee whose university used Blackboard had previously been using WebCT with students.

Students' and teachers' activities

The interviewees mentioned a range of activities which they or their students carried out using the VLE. The tasks set for students were sometimes individual pieces of work, but usually included collaborative work such as discussion or peer review. Often this work was carried out in groups of between 4 and 10 students. For example, one interviewee reported that her students were divided into groups which mixed work-based distance learners with younger, campus-based students for a role-play exercise. Some of the interviewees required their students to write short papers or presentations and post these in a course VLE forum; other students were then asked to post critiques of these pieces of work. Activities also included: online discussions or debates in response to questions set by the teacher; collaborative writing tasks; and extended group projects. Interviewees also mentioned teaching and management tasks that they needed to carry out. These are summarised in Table 3.4.

Teaching tasks	Management tasks
Marking students' online work and posting up grades; Providing resources, worksheets and links to useful web sites; Setting quizes; Responding to questions via the forums or via email; Using moderating skills to motivate students; Facilitating or summarising discussions; Providing key information and updates; Giving technical help to students.	Creating and maintaining a suitable structure for their course areas on the VLE; Putting students into groups with their own forums; Maintaining a course calendar with events and key dates; Tracking students' participation; Archiving messages in forums when they got too full; Handling the transition from one year to the next.

Table 3.4 Teaching and management tasks

Educational aspects

All the interviewees were convinced of the value of using the communication facilities of a VLE with their students. Three of them had experienced computer-mediated communication as learners on postgraduate courses they had studied. When asked to what extent use of CMC provided educational value, they responded using expressions such as "huge", "tremendous". Their views were that the VLE provided a richer learning environment for students, encouraged them to be more active and engaged, and resulted in deeper learning.

Interviewees said that VLEs could support different learning and teaching styles and, in particular, facilitated an approach based on learning as a social and active process. Equality of participation was also mentioned, both in relation to the balance among students (encouraging quieter students to take part) and the balance between teachers and students (allowing students to challenge teachers, and supporting student-led activities). One interviewee

expressed her hope that students would become more than just "consumers of courses".

Two of the interviewees mentioned that having the VLE environment meant that face-to-face classes improved. The VLE was used for preparatory resources and activities, which freed up time in face-to-face sessions:

> "[...] they're much better prepared for the seminars when they come, and consequently the tutorials are much more interactive - everybody's done something, everybody's answered a question and they're much more willing to participate." (Henry)

Face-to-face sessions could then become more like tutorials, with deeper and broader discussions, rather than being used to provide basic information. The VLE forums could also be used to continue discussion after a face-to-face session.

The asynchronous nature of VLE forums was seen as an advantage in terms of reflective learning. Interviewees pointed out that students have time to think about what they want to say, and can edit their contributions before they post them. They can also spend time thinking about others' contributions without needing to respond straight away. However, interviewees also pointed out that the public and permanent nature of the forums could cause anxiety for some students (and also for some staff). Having students working in small groups within private forums was seen to alleviate this to some extent, as students felt less 'observed'.

Several of the interviewees were trying to encourage other members of staff to use the VLE, but they found this a difficult task. Some of their colleagues were concerned than any online elements would alienate students. However, the interviewees also said that, once their colleagues had overcome the initial hurdles, many became enthusiastic and enjoyed the new way of working.

Community and communication

Interviewees highlighted the role of the VLE in building community among their students. The flexibility of time and place provided by asynchronous forums was seen as particularly important to distance or part-time students, to students who lived at a distance from the campus and to those who were on placements:

> "A few of them can meet in small local groups. But this gives a much stronger, much deeper sense of community by enabling people to communicate and get to know each other." (Eleanor)

Several interviewees mentioned the value of the VLE as a medium for providing information and notices to students. This was normally done via a course Calendar for events and a 'News' area or forum for more general information. However interviewees were concerned that some students did not go into the VLE often enough to pick up important items. Some interviewees mentioned that VLE messages were automatically forwarded to students' external email accounts, in order to overcome this problem. This was seen as a useful feature, removing the need to rely on students logging into the VLE. But it was pointed out that the facility needs to be tailorable

by teachers and students, in order to avoid large volumes of unwanted emails.

One interviewee said that the VLE provided a "virtual life" for his student teachers, who spent most of their time in schools on teaching practice, and often felt isolated and lonely. For these students, knowing that others were in the same situation and facing similar problems was reassuring:

> "I think they just really like to talk about that and know that somebody else is experiencing that, because nobody else in their school is probably experiencing that. Or at least nobody they're seeing on a daily basis. And it's really nice for them to log on and just go and tell somebody else and to hear somebody else saying 'Well, yeah, you know, I had that'". (John)

Two of the interviewees were keen to extend the reach of the VLE beyond individual courses, to build a student-led online community encompassing all students in the department and including department alumni. The interviewees were clearly confident that it was possible to build relationships, understanding and community online.

Participation and assessment

One problem which the interviewees mentioned was low participation by some students. Interviewees felt that there were a number of factors which discouraged students from taking part in online activities. These included: lack of experience and confidence with ICT; technical/usability problems; and time demands. One interviewee said that there was an underlying

anxiety when students were new to the VLE environment. Some students were nervous and some were "technophobes". Negative attitudes could then easily spread to other students.

To address the issue of participation, several of the interviewees included online activities as part of their course assessment strategy. The marks allocated to online tasks acted as motivation to persuade students to use the system. Then "once they are doing it, they see, and are enthusiastic". Another interviewee reported that an early assessed activity was effective in getting students comfortable with the system and in overcoming initial anxieties.

Interviewees discussed specific aspects of the VLEs which were related to participation and assessment. Tools for tracking students were highlighted as useful, for example seeing when a student had last logged on or how many messages they had read and written. In some systems it was also possible to tell which students had read which messages, and this was seen as a desirable feature. Several of the interviewees had used the VLE facilities for online submission of assignments, but some problems were identified with these. For example, in one system the tools were reported to be cumbersome and not adequate for giving full feedback. Two interviewees (using different systems) expressed a need for students' work to be submitted anonymously. This was to support peer review processes, and so that students' work, feedback and grades could be shared while still maintaining privacy.

Time problems

Interviewees reported that the time they spent working with the VLE varied considerably, and several said that time was the biggest problem for them. During intensive teaching periods they might log in three or four times a day, spending up to two hours per day. During quieter periods they might log in about three times a week.

Interviewees discussed two areas of their VLE work which took time. The first was learning how to do things, overcoming small hurdles and helping students with technical problems. The second was closer engagement with students, and having them constantly in touch. Having students constantly in touch caused extra pressure and stress, particularly when they had problems which they needed help with. Other interviewees mentioned that students seemed to expect instant information and immediate replies from their teachers.

Interviewees said that they had needed to spend more time when they were new to the system, and subsequently when setting up new courses; efficiencies and some practical time-saving came later. One interviewee said that it was important that the VLE system was itself efficient and did not add to administration tasks. Interviewees also pointed out that students faced similar issues in relation to the time needed for online work. In particular, they needed to log on often enough to keep up with the volume of messages.

Forums

Several of the interviewees mentioned the benefits of discussion forums (the equivalent of FirstClass computer conferences). They reported that forums

helped them to keep in touch with their students and helped students keep in touch with each other, which was important for building community. The forums allowed students to ask questions and gain answers from the teacher or from other students. All these aspects were particularly significant for distance learners. Interviewees also pointed out that forums can build into a resource based on students' own knowledge, giving a sense of ownership. The forums develop into an archive of students' work and resources, which is valuable for revision.

However, the interviewees pointed out a number of problems which arose when using forums for discussion. These relate to handling the large number of forums, messages and discussion threads which can build up in an active course. Interviewees said that the volume is often too great and that this can overwhelm and demoralize students, particularly if they are late joining the forums, or do not log in often enough:

> "The biggest [problem] I think is the culture of communicating in a text-based environment and managing that form of communication [...] it's being able to manage that wall of information that you've got, that permanency. You've got to almost be able to filter the information much more effectively. In some sense be quite ruthless, 'I'm going to reply to that but I'm not going to reply to that', and recognise that it's OK to do that. And it's those sorts of issues that students can be overwhelmed by." (Michael)

Interviewees indicated that archiving or deleting some messages could help, but this also caused problems when messages that students might wish to refer back to were no longer there.

Interviewees explained that students have difficulties finding their way through the different discussion threads, and posting messages in the right place. Discussions can easily be "lost" or "buried", so when students need to refer back to a message, they often cannot find it. Two of the interviewees said that they advise students to mark messages as 'unread' if they will need to go back to them later. Most of the interviewees reported that students often put messages in the wrong place: they start a new thread when they should be replying to an existing one; or they begin discussing a new subject in the current thread:

> "I find personally that the threads don't really work because students don't stick to the thread. They compose a new message but the same subject. So it is quite difficult to track, when you get a lot of messages, where the threads actually are." (Eleanor)

One of the interviewees said that the topic of a thread can subtly change, and that it would be helpful to reply using a modified thread title in order to reflect this. Another interviewee pointed out that students post messages to the wrong forum, as well as to the wrong thread within a forum. For example, when working in groups they might post to another group's forum by mistake.

Specific system features were mentioned which some students find confusing. For example, one of the interviewees explained that, in the VLE she uses, the user can display messages either ordered chronologically or displayed as threads; threads can be 'collapsed' or 'uncollapsed'; and the user can choose whether to see all messages or only those they have not yet read. She said that students get muddled and lose track of things, partly because they don't realise which of the settings they are using. However, interviewees also pointed out the value of features such as these: collapsing threads means that forums can seem less overwhelming to students; and it is useful to have forums, threads and messages available together in order to see the structure of the discussions. Another useful feature highlighted by interviewees was the ability to open a number of messages together and see the content of all of them at once. One of the interviewees said that students ought to be able to skim rapidly through the threads, picking out the messages that interest them.

One the interviewees reported that, because of the "anarchy" and lack of coherence of some forums, he did not use them for discussion among students. Instead he used forums as a place for structured activities where students posted set pieces of work and others posted comments on them. For similar reasons, another interviewee did not use large discussion forums - only those for small groups. However he pointed out that his university's VLE automatically sets up a whole-cohort forum for every course and he has to delete it. A third interviewee said that she thinks carefully about how many students to have in a forum. Previously her cohort of about 100

students were in four tutorial groups, but the volume of messages in each was too great, so she planned to use smaller groupings in future.

Synchronous communication

Several of the interviewees mentioned having tried, or wishing to try, synchronous tools, such as chat rooms or group whiteboards. For example, one VLE system offered chat rooms related to courses, as well as more general chat rooms which students could join. Some of the chat rooms were set up to create a transcript of the chat session, which was seen as useful. Some interviewees thought that students might find chat rooms helpful, particularly for decision-making, which they reported to be difficult asynchronously.

However, the interviewees who had tried chat rooms had not had much success. One interviewee had started his VLE use with chat rooms, but felt unable to be "present enough" for students' needs. Another had used chat rooms in an earlier version of his university's VLE but found the current version too difficult to use. Other interviewees felt that chat rooms were difficult to manage for students and tutors if there were more than a few people, and that the discussions lost structure and depth. This was felt to be partly because students did not have time to reflect on their contributions.

Overall, the interviewees had mixed feelings about the use of synchronous chat. One interviewee reported a similar mixture of reactions from his students:

"There was a variety of feedback. Some saying I could never get

on, some saying I could never get on at the right time, others

saying we got in there and we made some decisions quickly and it

was very useful." (Mark)

Visual aspects

Several interviewees mentioned limitations in the visual aspects of VLEs. It

was important to them that the environment should be interesting to look at,

and that it should reflect the character of their institution and course.

Interviewees wanted to be able to customise features in order to create a

sense of identity and a pleasing appearance:

"I'm one of those people that I like things to look as nice as

possible [...] For me it's quite important that all these things are

the right size, that things kind of look as nice as possible, like

having pictures and things in there and all that kind of stuff."

(Judith)

Interviewees mentioned wanting to replace textual links with clickable

images, to choose different icons, and to change fonts and colours. These

things were possible, but on the whole were difficult and time-consuming to

do. Interviewees pointed out that the ability to change fonts and colours was

particularly important for students with visual disabilities or dyslexia.

Interviewees also wanted students to be able to work with non-text media

such as graphics and video, but this was not easy. Difficulties with non-text

media were particularly frustrating for the two interviewees who were art

teachers. One showed a paper copy of a student's notes - which included drawings as well as words and symbols - and said that students ought to be able to communicate like this online. The same interviewee had tried to create an "exhibition area" for students, but this was problematic, partly because of file-size limitations.

Usability issues

Many of the comments made by interviewees related to technical problems and usability issues. The specifics of these varied from system to system, and included: compatibility problems with different browsers and computers; difficulties with certain system tools, such as wikis and whiteboards; problems with passwords and time-outs. These are in addition to the problems already mentioned with forums and graphics. There were also specific tasks teachers needed to carry out which seemed unnecessarily complicated. For example, four of the interviewees mentioned problems checking that students were correctly registered in the system; ideally this would be done automatically via a link to the university registry. Some interviewees had concerns about managing the transition from one year to the next.

In general, interviewees described technical problems and usability issues as "quirks" which were "irritating". Several mentioned that they wrote instructions to help their students with certain problematic features. A significant general theme that emerged was that these hurdles were off-putting to both staff and students, and led to lack of participation. It was pointed out that staff need to simplify their work, not complicate it, and that

students struggling alone with technical problems become frustrated and angry, and soon stop using the system:

> "So it's all sorts of little glitches like that which, unless people are fairly confident [...] I've found there's about 11% who just stop using it, and that's fairly consistent each year. It's usually about 10, 12%. And I'm sure that that's an important contributing factor to that." (John)

A further theme that emerged was the need for flexibility. The interviewees reported that the systems did not quite do what they wanted, so they needed to adjust their approach to fit the system. One interviewee said that he had spent the last few years "designing around the restrictions". Interviewees said that teachers want to use system features in different ways, and to customise the environment as they go along. They don't want to be restricted to a particular structure or model. The systems need to cope with different teaching styles and educational approaches.

Overall the interviewees wanted systems to be straightforward and logical, particularly in terms of navigation. They said that this was particularly important, as users often received little or no training. However, interviewees also pointed out that no system will be intuitive for everyone, and that there is a tension between the need for a system which suits most users and one which can be tailored to individuals. Having a skilled and cooperative local support team was mentioned by several interviewees as a significant factor in overcoming difficulties.

3.3 Discussion of interviews with university teachers

As university teachers, the interviewees were naturally focused on the learning aspects of using CMC. Their comments tended to be about the educational benefits and issues of CMC in general, rather than specific features or aspects of CMC tools. Moreover, as early adopters of these systems, they had commitment to the benefits and had themselves overcome many of the problems. However, the interviews did identify a number of areas where the communication facilities of VLEs are not fulfilling their potential. This section attempts to highlight these areas and draw out some ideas on how CMC facilities might be improved.

Forums

It was clear from the interviews that the volume of messages in discussion forums causes problems for students, who find it difficult to cope with the organisation of messages into different forums and threads. Facilities such as collapsing threads, which are intended to help users deal with volume, seem to cause additional problems for some students. Because students are confused about how the discussions are represented, they post messages in the wrong place, leading to further confusion.

Addressing these problems requires careful design and evaluation of the structures, facilities and user interfaces of discussion systems. The forums and their contents need to be organised and displayed in a way which makes the relationships between messages clear to users. Users should be able to see the content of messages and their context at the same time, in order to gain a sense of coherence from the discussions. Tools should be available to

help users view the content of forums in different ways, but these tools need to be evaluated with novice users, to make sure they help rather than hinder.

Tools are also needed to support teachers in creating and maintaining discussion forums. Teachers need user-friendly facilities for creating forums, setting permissions, and adding or removing students. They also need tools for managing the messages in forums. In particular, facilities are needed to help teachers archive messages. An automatic archiving facility (for example, which moved complete threads after a certain period of inactivity) could help teachers and students deal with the volume of messages.

Teachers need to be sure that they have a reliable communication path to all students. This requires a notification facility which links into students' everyday email accounts. Important messages could be automatically forwarded, so that teachers were not reliant on students logging into the system. The notification facility should be under user control, so that students who use the system frequently can switch it off, and infrequent users can be notified of other messages if they wish.

Managing teaching

Teachers want to create well-structured and inviting online learning spaces for their students. They need to provide resources and information to students, and to bring important dates and events to students' attention. Facilities for carrying out these tasks should be integrated, so that resources, discussions and events can be linked together. It is important that teachers (and also students) can make VLE spaces look lively and interesting. Users

should be able to create a sense of identity - for a specific group, course, department or the university as a whole. This requires flexible and user-friendly tools for adding graphics and changing other visual features.

Teachers also need tools for tracking their students' online work. One basic requirement is for teachers to know that their students are all correctly registered in the system. This requires integration with university registration systems. Once students are registered, teachers need to be able to check that they are participating. Most VLEs allow teachers to see when a student last logged on, but more powerful features than this are needed. It would be helpful for systems to keep a log of when each student used the system and what activities they carried out. Examples might include summaries of which messages had been posted, and which messages or resources had been accessed, by each student. As Coppola et al. (2002, p. 186) have pointed out, in online learning:

> 'the managerial role, which deals with class and course management, requires greater attention to detail, more structure and additional student monitoring'.

VLEs provide tools to support online submission, feedback and grading of students' work. However these tools need to be enhanced so that teachers can deal with assessment effectively. CMC provides new opportunities for students to see and comment on each others' work, and to see the feedback received by others students from the teacher or their peers. But it is

important to maintain privacy, so CMC systems needs to allow these activities to be carried out without identifying individual students.

Synchronous tools

Most of the interviewees mentioned synchronous tools, notably synchronous chat. Not many had used these with any degree of success, although some thought they could be useful for decision-making or brainstorming. Some interviewees felt that the chat tools provided in their VLEs were too difficult to use, or that synchronous chat, in general, was too unstructured to support reflective discussions. This latter point is consistent with the view expressed by Cox et al. (2004, p. 184) that

> 'online chats have sometimes been regarded as suitable for community building because of the enhanced sense of shared presence but inappropriate for reflective conversation'.

The points raised in the interviews suggest that chat tools could be useful if they were improved. One specific aspect mentioned was the importance of having a transcript, so that the discussion is not lost once the chat session is over. Other comments indicate that the discussions become confusing, which may mean that they need to be represented in a different way, so that speakers or topics are more clearly separated (e.g. McAlister et al., 2004).

Usability and flexibility

The interviews highlighted the fact that technical and usability issues still cause serious difficulties for users of CMC systems. These problems result in disengagement by students, and unwillingness by staff to use the systems.

Salmon (2002, p. 14) describes how new CMC users may react to technical and usability difficulties:

'Most people will blame the system, the hardware or the IT people. Some will assume they themselves are incompetent. Participants can become very upset or angry.'

Hopefully, technical problems such as software and hardware incompatibilities will decrease as support staff are made aware of them. However, problems related to usability need to be addressed in a different way. Although there are a range of well-tried methods for designing usable computer systems (Blomberg et al., 1993; Holzblatt & Beyer, 1996; Shneiderman, 1998), CMC systems raise difficult problems in this area because they involve groups of users interacting. The systems need to be tested for usability with groups of people whose skills and experience (or lack of these) match those who will use the systems in practice.

As well as the need for systems that are easy to use, it is important that CMC systems are flexible. Teachers need to be able to tailor the system to their own educational purposes and settings, rather than being constrained by rigid and overly standardised systems. Teachers should be able to use and integrate a range of tools in order to create a learning environment that suits their own course and their own students. Moreover, some students - those with more confidence and experience of ICT - will want to personalise the system, so that it meets their own preferences for interacting and studying.

Achieving a combination of good usability and high flexibility is a significant challenge

3.4 Conclusions from interviews with university teachers

This part of the research has brought together the views and experiences of a number of university teachers who use the communication facilities of VLEs to support their students. The teachers used a range of different VLEs, and used them for different purposes, but all had the aim of enhancing learning for their students. In addition, many of the teachers wanted to increase the sense of community among students. The interviews indicated that teachers were positive about the use of communication facilities in VLEs and felt that there were significant gains in learning and community-building.

However, it is clear that there are problems with the communication facilities in VLEs, and that these are detrimental to students and staff. If the problems were alleviated, educational benefits could be increased further. Some of the problems can be encompassed under the broad banner of usability, but within this context there is a strong focus on difficulties negotiating the volume of messages in discussion forums. There is a need for investigation of how discussions are represented in forums, and of the tools provided for navigating within them.

4. Overview of user interviews

This stage of the research seemed to fulfil its objectives. It identified issues related to CMC, and CMC systems, which were of concern to learners, tutors and teachers. Two major themes emerged from the interviews with

user groups. One was the problem of information overload and of negotiating messages in discussion forums. CMC systems need to provide better support to users when dealing with large numbers of messages. The other theme was the importance of a sense of community and connection among students, and hence the need for tools to enhance social presence. Facilities are needed to help students to get to know each other and to communicate in real time.

The second stage of the research focused on each of these two themes in turn. In each case, CMC system features were considered which might address the issue. These features were then implemented in a prototype conferencing system and evaluated with students. Chapter 4 discusses the evaluation of features aimed at alleviating information overload. Chapter 5 discusses features aimed at enhancing social presence.

Chapter 4

Prototyping to address overload

As a result of the interviews with students and teachers it was clear that users of CMC systems gained many benefits from them, but also experienced problems. The question then arises as to whether changes to a CMC system could help to enhance the benefits and alleviate the problems.

In the interviews, some users had suggested new features which they thought would be helpful, and some had identified existing features which they valued. Reviews of the literature also shed light on the issues faced by users, and how these might be addressed. Finally, awareness of existing discussion systems provided ideas for possible system enhancements. Taken together, this knowledge allowed the formulation of hypotheses about CMC features which might provide benefits to users. Two sets of features were investigated: (1) features aimed at alleviating overload and (2) features aimed at enhancing social presence. This chapter discusses the investigation of CMC features aimed at alleviating overload.

The chapter begins by presenting the context used for evaluating CMC features with students: the course and the prototype web-based conferencing system which was used. It then introduces the CMC features aimed at addressing overload, and the methods used for gathering quantitative and qualitative data from students. The results are then presented and discussed. Finally, conclusions are drawn about the CMC features and the research approach.

1. Prototyping in an Open University course

A decision was made to develop a prototype conferencing system as a test-bed for evaluating new system features. This prototype would be used in a field trial with OU students. The development of a new course, TT380 *Databases within Website Design,* provided an opportunity to put this approach into practice. The prototype system formed the case-study for the course, as well as being the main group communication tool which students used. As part of the course, students could see how system features were implemented in the database underlying the web-based conferencing system. They also used the conferencing system for their day-to-day group communications on the course, thus experiencing the system from the user's point of view.

1.1 The course

TT380 is one of a suite of 100-hour courses which together form the Open University's *Certificate in Web Applications Development.* The first two presentations of TT380 were in May and October 2004, and it has been presented twice a year since then, typically with over 100 students per presentation. The course, which is at third level, is studied part-time, at a distance, over a period of 12 weeks. Students are provided with a set book, together with teaching and assessment material delivered online, mainly as PDF files.

To support their learning, all students on the course have access to computer conferences where they can ask questions, help each other and share ideas. The conferences are moderated by Open University academics or

consultants with expertise in the topic of the course. At the start of the course students use the Open University's FirstClass conferencing system, with which most are already familiar from previous courses. This is to make sure students can communicate easily with each other, and with the course moderator, at the beginning of the course. Then two weeks into the course they change to using the prototype conferencing system.

1.2 The prototype system and its evaluation

The prototype conferencing system, named 'Message Forums', is web-based. It was developed using Coldfusion, with MySQL for its underlying database aspects. The author of this thesis was responsible for specifying the aspects of the system which were relevant to the research. This involved: deciding which system features would be investigated; carrying out some exploratory prototyping work; and specifying the details of the chosen features. The author was not involved in the implementation of the Message Forums system.

As shown in Figure 4.1., Message Forums has separate browser frames displaying:

- conferences;

- lists of threads in the current conference;

- lists of messages in the current thread;

- the content of the current message.

For the purposes of evaluating system features to alleviate overload, two versions of Message Forums were built: a 'basic' version and an 'enhanced'

version. The 'basic' version had features similar to those provided by the web interface to FirstClass. This meant that most of the facilities were familiar to students, even though the user interface was different. The 'enhanced' version had a set of additional features whose value for students was to be evaluated. The purpose of creating two versions of the system was to allow them to be compared in use. Any differences which arose, either in students' reactions, or in aspects of usage, could be the result of differences between the two versions i.e. the additional features in the 'enhanced' version.

There are different methods which could have been used to carry out the comparison between use of the 'basic' and 'enhanced' system. One approach would have been to split the student cohort into two groups, one using the 'basic' system and one the 'enhanced' system. However, this was not possible within the educational context of the course, because all students needed to be taught about the database implementations of features in the 'enhanced' system. An alternative approach would have been for one group of students to start with the 'basic' version, a second group to start with the 'enhanced' system, and then the two groups to swap. However, again this was not possible because the structure of the course required that all students were introduced to the 'enhanced' system features at a specific point in their studies. The approach adopted was therefore for all students to start with the 'basic' version and then swap to the 'enhanced' version. This method meant that all students had experienced both versions, and were able to give their reactions to both and make comparisons between them. A

disadvantage of this method is that students' use of the 'enhanced' system, and their reactions to it, could have been be influenced by their earlier experience of the 'basic' system.

Figure 4.1 shows the 'enhanced' version of the system. The frame across the top shows the course conferences. The main upper left frame shows the list of threads in the current conference. The lower left frame shows the headers of messages in the current thread. The main right-hand frame shows the content of the current message. Further details of the conferencing system facilities are discussed below.

Figure 4.1   The 'enhanced' version of the Message Forums prototype conferencing system (users' surnames have been replaced by asterisks)

2. Investigating features to address overload
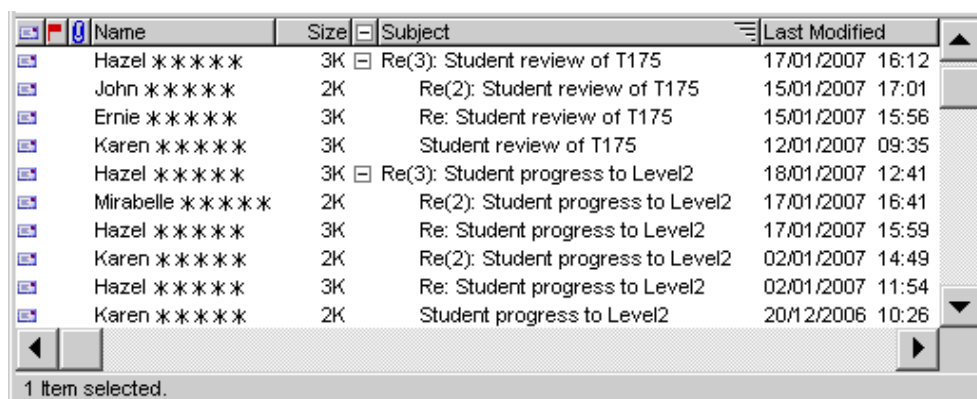
One of the main themes which had emerged from the interviews with students, tutors and teachers was information overload. This was mainly related to having too many messages to work through. Open University students also experienced overload from the number of conferences which were available to them. The research reported here focuses on the issue of dealing with overload of messages, and investigates system features which might help to alleviate this problem. The details of these features, and the rationale for including them, are discussed in the sections which follow. In summary, the features are:

- branched message threading;

- a facility for users to recommend messages;

- a facility for filtering out messages;

- a personal clippings' area for keeping a record of useful messages.

2.1 Message threading

One of the CMC system features identified by interviewees as helpful was message threading. If threading is used correctly it has two main benefits: it groups messages by topic; and it allows users to follow the messages in a meaningful order. This helps to overcome the confusion which users of CMC systems can experience when messages are read out of context. Although the interviewees had identified threading as a helpful feature, it was also clear that students have problems with threading, and can become confused when using current systems (Salmon, 2000, p. 43; McConnell,

2006, p. 73). For example, although FirstClass can group the messages in a

single thread together, it does not have a very clear way of representing

which messages are replies to which. This means that it is not obvious in

what order to read them (see, for example, the lower thread grouping in

Figure 4.2).

Name	Size	Subject	Last Modified
Hazel ✴✴✴✴	3K	Re(3): Student review of T175	17/01/2007 16:12
John ✴✴✴✴	2K	Re(2): Student review of T175	15/01/2007 17:01
Ernie ✴✴✴✴	3K	Re: Student review of T175	15/01/2007 15:56
Karen ✴✴✴✴	3K	Student review of T175	12/01/2007 09:35
Hazel ✴✴✴✴	3K	Re(3): Student progress to Level2	18/01/2007 12:41
Mirabelle ✴✴✴✴	2K	Re(2): Student progress to Level2	17/01/2007 16:41
Hazel ✴✴✴✴	3K	Re: Student progress to Level2	17/01/2007 15:59
Karen ✴✴✴✴	2K	Re(2): Student progress to Level2	02/01/2007 14:49
Hazel ✴✴✴✴	3K	Re: Student progress to Level2	02/01/2007 11:54
Karen ✴✴✴✴	2K	Student progress to Level2	20/12/2006 10:26

1 Item selected.

Figure 4.2   Threading in FirstClass

Many discussion environments use a hierarchical approach to displaying

messages. This assumes that the user wishes to reply to the message they are

currently reading, rather than to the thread discussion as a whole. The result

is a branching structure of initial messages, replies and replies-to-replies.

However, other discussion environments use linear threading, where a

thread is simply a chronological sequence of messages. A user of a

discussion system with linear threading may think of their comment as a

reply to a particular message, but they cannot link their comment to that

specific message.

The issue of whether a reply in a conferencing system should be to an

individual message or to the thread as a whole has been debated, both in the

early days of computer conferencing (see Rapaport, 1991 pp. 146) and more recently (Hewitt, 2001). As Nicol, Minty & Sinclair (2003, p. 279) state,

> 'Even apparently simple acts like organising online discussions into different virtual spaces, or even threading discussions in particular ways, will have significant effects on the nature of student interaction and on the discourse structures that result.'

Based on findings from an earlier study of threading (Kear, 2001), a hypothesis of the research was that a branched threading display would help users to conceptualise the relationships between different messages, and would therefore make them feel less overloaded. To investigate this hypothesis, students were exposed to the two different versions of threading while using the prototype conferencing system. In the 'basic' version of the system, threads were shown simply as chronological lists of message headers (see Figure 4.3a). In the 'enhanced' version, branching of messages was shown using indentation of the message headers (see Figure 4.3b).

(12) Messages in: Supplier Update			
Refresh List			
Message Subject	**Author**	**Date/Time**	**Rec'md**
📄 Supplier Update	Elaine ****	22 Dec 04 21:10	0
↳ Supplier Update	Mike ****	22 Dec 04 21:37	2
↳ Supplier Update	Robert ****	22 Dec 04 21:37	0
↳ code	Elaine ****	22 Dec 04 22:12	0
↳ code	Mike ****	22 Dec 04 22:17	0
↳ code	Mike ****	22 Dec 04 22:21	5
↳ code	Robert ****	22 Dec 04 22:22	0
↳ Error Message	Elaine ****	22 Dec 04 22:29	0
↳ Error Message	Robert ****	22 Dec 04 22:35	0
↳ Error Message	Robert ****	22 Dec 04 22:37	0
↳ Error Message	Elaine ****	22 Dec 04 22:38	5
↳ Error Message	Robert ****	22 Dec 04 22:42	4
Top			

Figure 4.3(a) Linear threading

```
(12) Messages in: Supplier Update
Refresh List
Message Subject          Author       Date/Time        Rec'md
📄 Supplier Update        Elaine ****   22 Dec 04 21:10    0
  ↳ Supplier Update       Mike ****     22 Dec 04 21:37    2
  ↳ Supplier Update       Robert ****   22 Dec 04 21:37    0
    ↳ code                Elaine ****   22 Dec 04 22:12    0
      ↳ code              Mike ****     22 Dec 04 22:17    0
        ↳ code            Mike ****     22 Dec 04 22:21    5
      ↳ code              Robert ****   22 Dec 04 22:22    0
        ↳ Error Message   Elaine ****   22 Dec 04 22:29    0
         ↳ Error Message  Robert ****   22 Dec 04 22:35    0
           ↳ Error Message Elaine ****  22 Dec 04 22:38    5
             ↳ Error Message Robert **** 22 Dec 04 22:42   4
           ↳ Error Message Robert ****   22 Dec 04 22:37    0
                              Top
```

Figure 4.3(b) Branched threading

A further aspect of threading is the extent to which threads are visually
separated from each other. In some systems, including FirstClass, the only
visual separation of threads is provided by grouping together the headers of
messages which are in the same thread, within the list of all the message
headers (see Figure 4.2). In other systems it is only possible to see the
message headers in one thread at a time. This second approach was adopted
in the prototype system. Two frames were used: one to display the list of
initial message headers for each thread, and one to display the headers of all
messages in the current thread (see Figure 4.1).

One final aspect of threading under investigation was message titles. Most
systems (including FirstClass) use the same title for all messages in a thread,
possible prefaced by 'Re:' (or a similar indicator that the message is a
response). This means that users are given only a general idea of the subject
of a given message. This is a particular problem in long threads, which may
be subject to 'topic drift', where some or all of the discussion moves away

from the original subject. To address this issue, the prototype system

prompted users to give their own title for each message they submitted

(though they were also given the option of using the default thread title).

2.2 Recommending messages

One aspect of overload identified by the student interviewees was the

difficulty of "sorting the wheat from the chaff". In conferences with large

numbers of messages, it is difficult for users to identify messages which are

particularly worth reading. This problem also applies to large-scale web

discussion forums and social networking sites, and some of these have

adopted recommendation or voting systems (see, for example, *slashdot.org;*

digg.com). In these systems, users can rate others' contributions, and the

collated ratings can then be used as a guide to which contributions to read

(Preece, 2004, p. 60; Dron, 2007, p. 148). The idea of implementing user

recommendations is not new (Resnick & Varian, 1997). For example,

Konstan et al. (1997) applied it specifically to internet newsgroups.

In the enhanced version of the prototype system, users were provided with a

facility to rate messages. Variations on the approach were tried, using

different words to describe the rating process ('vote' and 'recommend'). The

aim was to encourage users to rate messages, so that enough ratings would

be built up to be useful to others. This meant that using the system to rate a

message had to be quick and easy. There also had to be a way of usefully

collating the ratings, even if there were only a few for a given message. The

final implementation allowed users to 'recommend' a message with a single

click. The number of recommendations for each message was displayed in the message header list.

2.3 Filtering

Systems which have user ratings often combine these with filtering facilities. This approach is sometimes described as 'collaborative filtering' (Goldberg et al., 1992; Resnick et al, 1994). Users can set a threshold to filter out messages with low ratings, and this can be an effective way of 'separating the signal from the noise', as one student interviewee put it. Again, some discussion-based web sites (such as *slashdot.org*) use this approach. It can be particularly valuable for dealing with objectionable or 'spam' messages, as these will have low (or negative) ratings. With an appropriate filter setting the user simply does not see them.

One problem with filtering in discussion systems is that if messages are omitted from the displayed list, the connectivity of a thread can be disrupted (Palme et al. 1996). Given the hypothesis that the relationship between messages is an important aspect, the implementation of filtering in the prototype conferencing system needed to deal with this issue. The solution adopted was to 'grey out' messages within the display of a branching thread, rather than not displaying them at all (see Figure 4.4). This meant that the connections between messages were visible and users could click on a greyed out message to read it if they wished. If all the messages in a thread were filtered out, the thread was not displayed at all.

```
(12) Messages in: Supplier Update
Refresh List
    Message Subject        Author        Date/Time       Rec'md
📄 Supplier Update       Elaine ****    22 Dec 04 21:10     0
  ↳ Supplier Update      Mike ****      22 Dec 04 21:37     2
  ↳ Supplier Update      Robert ****    22 Dec 04 21:37     0
    ↳ code               Elaine ****    22 Dec 04 22:12     0
     ↳ code              Mike ****      22 Dec 04 22:17     0
      ↳ code             Mike ****      22 Dec 04 22:21     5
       ↳ code            Robert ****    22 Dec 04 22:22     0
        ↳ Error Message  Elaine ****    22 Dec 04 22:29     0
         ↳ Error Message Robert ****    22 Dec 04 22:35     0
          ↳ Error Message Elaine ****   22 Dec 04 22:38     5
           ↳ Error Message Robert ****  22 Dec 04 22:42     4
          ↳ Error Message Robert ****   22 Dec 04 22:37     0
                                          Top
```

Figure 4.4   Filtering of messages

Messages can also be filtered according to parameters other than user ratings
(Palme et al. 1996). Those considered as potentially useful for alleviating
overload were the age of the message and whether the user had read it.
Filtering options were therefore provided along these lines. The result was a
filtering facility with four settings, as follows.

- Recommended: filters out messages with no recommendations;

- Recent: filters out messages posted more than a week ago;

- Unread: filters out messages which the user has read;

- All: no filtering is applied.

2.4 Clippings

The facilities described so far were aimed at supporting users in finding
their way through discussions, and in locating useful messages. Another
important aspect for users is keeping a record of messages which they have

found useful. Therefore a further feature was added to the prototype system: the ability to make a 'clipping' of a message. When a user reads a message which they find useful, they can click on a button to 'clip' the message. A reference to it is then stored in their own private area in the system, which is divided into user-defined categories (see Figure 4.5). When a user clicks on their clipped message, they are taken to the conference and thread where that message is located. This ensures that the context of the message is retained.

Figure 4.5   A personal clippings area, with user-defined categories

3. Gathering data on overload

The new features were evaluated in the first two presentations of TT380, which started in May 2004 and October 2004. Using a survey approach students were asked about:

- their prior experience of electronic communication;

- how much time they spent using the TT380 conferencing system;

- whether they felt overloaded, and if so what caused this;

- what proportion of the messages they read, and how they decided which to read;

- the proportion of messages that were useful to them;

- their views on specific system features.

Data was gathered relating to two stages of the course: the first while students were using the 'basic' version of the conferencing system; and the second while they were using the 'enhanced' version, which had the new features. For each stage, students were asked similar closed questions about time spent conferencing, reading messages, and feelings of overload. This was so that comparisons could be made between use of the 'basic' version of the system and use of the 'enhanced' version. For the second stage, specific questions were also asked about the features that were only in the enhanced version: branched threading; voting; filtering; and clippings.

3.1 Data from the May 2004 presentation

For the May 2004 course presentation, feedback data was gathered from students via two online surveys which were available from within the conferencing environment. Table 4.1 shows the timing of these surveys in the 12-week course. The first survey took place just after the half way point, when students had been using the 'basic' version of the system for 5 weeks. The second survey was at the end of the course, after students had been using the 'enhanced' version for about the same length of time. The surveys contained both open and closed questions on the aspects of students'

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conferencing experience listed above. The questions and results from the

surveys are given in Appendix 4A.

Week	Use of conferencing	Student surveys
1	Start using FirstClass	
2		
3	Change to use 'basic' version of Message Forums	
4		
5		
6		
7	Change to 'enhanced' version of Message Forums	First online survey
8		
9		
10		
11		
12		Second online survey

Table 4.1   Schedule for data gathering in the May 2004 presentation

The two surveys were available to all 70 students on this course

presentation, and students were encouraged to complete them. However the

response rates were low, with just 14 students completing the first survey

and 17 the second. The low response rate meant that it would be misleading

to draw conclusions from the quantitative data. For this reason, the

quantitative data from the surveys is not included in the analysis reported in

this chapter, though it is included in Appendix 4A. The qualitative data

(students' responses to open questions) is included in the analysis, as it

illustrates students' views, and the reasons for these views.

3.2 Data from the October 2004 presentation

Because the response rates were so low for the May presentation surveys, a second phase of data gathering was carried out during the October presentation, asking similar questions but using a different data collection method. This time feedback questions were appended to the three multiple-choice assignments which formed the course continuous assessment. It was made clear to students that these questions were optional.

This approach resulted in much improved response rates. The second column of Table 4.2 shows how many of the 110 registered students submitted each of the three assignments. The third column shows the percentages of those submitting each assignment who also completed feedback questions. The percentages varied slightly from question to question because not all students answered all the questions. Table 4.2 therefore gives the range for each assignment.

	Students submitting the assignment	Percentages completing the feedback questions
First assignment	99	86 - 88%
Second assignment	89	70 - 78%
Third assignment	79	77 - 82%

Table 4.2   Percentages of respondents to feedback questions

Having the feedback questions presented with the assignments meant that they were highly visible to students. It also made it quick and easy for students to respond. A further benefit was that the collation of responses was carried out by the university's assignment handling procedures, which ensured anonymity for students.

Table 4.2 shows how the data gathering stages fitted into the 12-week course. Feedback questions were appended to all three of the course multiple-choice assignments. The first assignment was 4 weeks into the course, about a week after students had changed from FirstClass to the 'basic' version of the prototype conferencing system. The second assignment was 7 weeks into the course, when students had been using the 'basic' system for about 4 weeks. The third assignment was 10 weeks into the course, when students had been using the 'enhanced' version of the system for about three weeks. The questions and results from the three sets of feedback questions are given in Appendix 4B.

Week	Use of conferencing	Assignments and data gathering
1	Start using FirstClass	
2		
3	Change to use 'basic' version of Message Forums	
4		Assignment 1, with first set of feedback questions
5		
6		
7	Change to 'enhanced' version of Message Forums	Assignment 2, with second set of feedback questions
8		
9		
10		Assignment 3, with third set of feedback questions
11		
12		End of course assessment. Online survey

Table 4.3   Schedule for data gathering in the October 2004 presentation

In order to supplement the data from the closed feedback questions appended to the assignments, the October presentation students were also asked several questions via an online survey at the end of the course. This survey started with three closed questions about students' degree of prior

experience, their level of conferencing activity in the course, and their perception of overload. The remainder of the survey consisted of open questions asking students' views on threading, recommendations, filtering and clippings. The questions and results from the survey are given in Appendix 4C.

The response rate for the survey was again low, with only 11 students answering all the questions. The quantitative data from the survey (i.e. the first three questions) is therefore not included in the analysis presented here. As before, the primary value of the survey is in the qualitative data it provides: students' views, in their own words, on the issues and features of the conferencing environment.

4. Results from feedback questions and surveys

This section summarises the findings from the research on overload. The main sources of data are the closed feedback questions appended to the October 2004 assignments. Qualitative data is also included from the open questions in both presentations' surveys. As mentioned, details of the results can in found in Appendices 4A-4C. The results are summarised in the following sub-sections, covering:

- respondents' prior experience;

- feelings of overload;

- time spent conferencing;

- reading messages;

- message threading;

- recommending messages;

- filtering facilities;

- the clippings facility.

4.1 Respondents' prior experience

The first few feedback questions asked students about their prior experience
of different types of electronic communication. The findings are summarised
in Table 4.4

	Percentage of respondents
Have used email extensively	83%
Have experience of FirstClass	88%
Have experience of other group communication systems	79%

Table 4.4   Prior experience of electronic communication

The results show that respondents were experienced users of electronic
communication systems in general, and also of group communication
systems (such as discussion forums and newsgroups).

4.2 Findings on feeling overloaded

The first of the three sets of feedback questions included a question asking
students 'Have you felt overloaded in any group communication systems
you have used?'. This was asked in the context of questions about prior
experience of electronic communication. Of those who had prior experience
of group communication systems, 57% said they had felt overloaded.

In the second set of feedback questions (when students were using the 'basic' system) and in the third set (when they were using the 'enhanced' system) students were asked 'Have you felt overloaded or daunted by the number of messages?'. The results are shown in Figure 4.6.
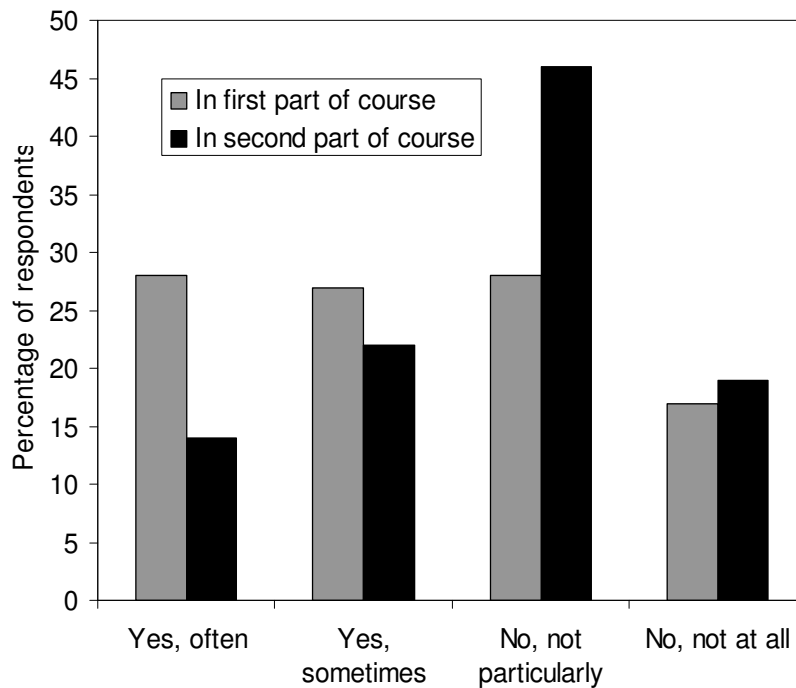
Figure 4.6   **Experience of overload in TT380**

When students were using the 'basic' version of the system, 55% of them felt overloaded, which was in line with their experience prior to the course. However, in the second part of the course, when they were using the 'enhanced' system, only 36% of students felt overloaded. This reduction occurred despite the fact that the average number of messages posted per day was higher in the second part of the course (16 messages per day) than in the first part (13 per day).

The decrease in feelings of overload seems clear from Figure 4.6, but its statistical significance needs to be investigated. The form of the data (grouped into just four categories, and not providing differences for individual students) is not ideal for this kind of analysis. Moreover, the participants were not randomly selected from a wider population, which casts some doubt on the validity of applying inferential statistics. Setting these problems to one side, a statistical analysis was carried out using a Mann Whitney test (see Appendix 4D) and the difference was found to be significant ($p<.05$). However, bearing in mind the limitations of the research design (discussed in Section 1.2 and below in Section 5.1), it cannot be assumed that the difference was a result of the change in conferencing system.

The second set of feedback questions (which related to the 'basic' system) asked students 'What, if anything, has caused you to feel overloaded?'. Of the students who felt overloaded, the largest group (71%) selected 'Too many unread messages'.

4.3 Findings on time spent

The feedback questions asked students how much time they spent per week, on average, using the conferencing system. This question was asked twice: once for the period of time when students were using the 'basic' version of the prototype system; and then again for the period when students were using the 'enhanced' version. The results are shown in Figure 4.7.
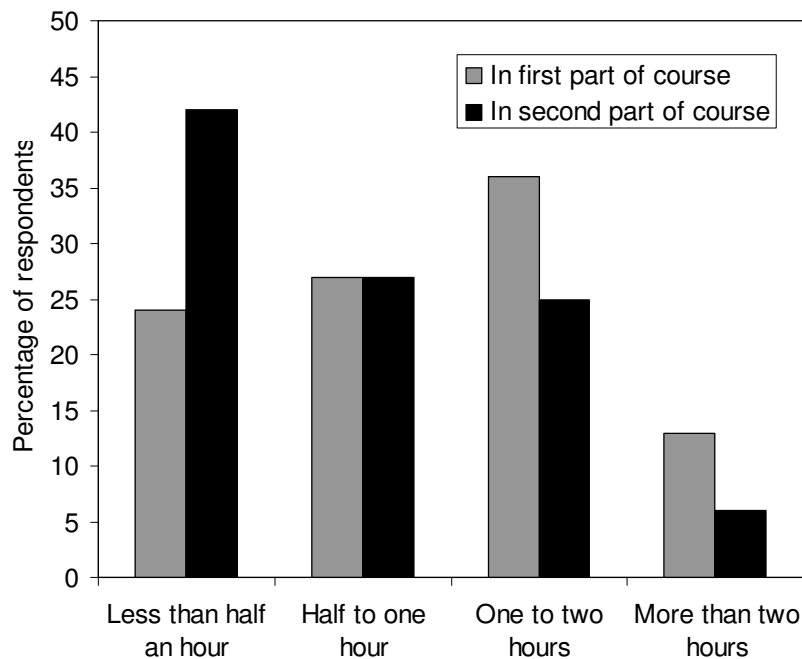
Figure 4.7   Time spent conferencing

In the early part of the course, when using the basic version of the system, the largest category of respondents (36%) spent between 1 and 2 hours conferencing. This is a considerable amount of time in the context of an 8-hour study week. In the later part of the course, when using the 'enhanced' version of the prototype system, students spent less time conferencing. The largest category of students (42%) spent less than 30 minutes per week.

As before, the Mann Whitney test was used to investigate the statistical significance of the difference in time spent conferencing (see Appendix 4D). Again, similar provisos apply to this process. However, setting these aside, the test indicated that the difference was significant ($p < .01$).

In the first part of the course, while students were using the 'basic' system, they were asked how they felt about the amount of time they needed to spend conferencing. Table 4.6 summarises the results. (This question was not asked in the second part of the course.)

Not a problem	41%
Just acceptable	41%
Too much	18%

Table 4.6   Feelings about time spent conferencing

It seems that most students were not overly concerned by the amount of time they were spending using the conferencing system.

4.4 Findings on reading messages

The feedback questions asked students what proportion of the messages they read. Again, this question was asked twice: once when students were using the 'basic' version of the system; and once when they were using the 'enhanced' version. The results are summarised in Table 4.7.

	When using 'basic' version	When using 'enhanced' version
Up to half of the messages	60%	62%
More than half of the messages	25%	26%
All of the messages	15%	12%

Table 4.7   Proportion of messages read

There was little difference in the proportion of messages read by students between the two parts of the course. Most students read less than half the messages, but a significant minority read all of them.

Students were also asked how they judged which messages to read. Again, this question was asked twice: once for the basic system and once for the

enhanced system. The results were similar each time the question was asked, with a majority of students (about 60%) selecting 'From the thread title', and a smaller proportion selecting 'From the message title'. The only other option selected by a significant number of students was 'By glancing at the message content'.

Students were asked (again, once for each version of the system) what proportion of the messages that they read were useful or helpful. The results are summarised in Table 4.8.

	When using 'basic' version	When using 'enhanced' version
Up to half of the messages	73%	72%
More than half of the messages	24%	25%
All of the messages	3%	3%

Table 4.8   Usefulness of messages

Again there was little change between the period using the 'basic' system and the period using the 'enhanced' version. Most students felt that less that half the messages were useful, but a small minority of students felt that they all were.

4.5 Findings on message threading

The third set of feedback questions included one asking students 'Was it helpful to see the branching structure of each thread?'. By this stage in the course, students had experienced both the 'basic' system, with no branching in threads, and the 'enhanced' version, which used message branching. A large majority of respondents (90%) said that seeing branching was helpful. Comments in surveys for both presentations explained that respondents preferred the branching display because

"it was easier to link related messages together".

A feedback question from the second assignment asked 'Was it helpful to have separate frames for threads and for messages (rather than having all the messages listed together)?' Both versions of the prototype system used separate frames for threads and for messages. Again a large majority of respondents (87%) said that having separate frames was helpful. One student said

"Good idea. Made the view less cluttered, easier to keep track of the threads."

Another suggested an alternative approach:

"The screen can be busy looking, with lots of text lists in different sections, maybe there could be some way to make the threads expand when necessary and contract when in a different thread."

A final feedback question relating to threading asked 'Was it helpful that users were encouraged to enter their own subject title for a new message?'. As shown in Table 4.9, although most respondents thought this was helpful, there were also a significant number who thought it was not.

| Helpful | 72% |
| Not helpful | 28% |

Table 4.9   Views on message titles

The responses to the open questions in the surveys illustrated students' views:

"It's a good idea, but at times seems tedious."

"Wholly admirable in concept and largely useless in practice.

Some people will always go for the default - usually when

changing the subject!"

4.6 Findings on recommending messages

The third set of feedback questions included one asking 'How helpful was

the facility for users to recommend messages?' The results are summarised

in Table 4.10.

Helpful	35%
Made little difference	61%
Unhelpful	4%

Table 4.10   Views on recommending messages

It was already clear from the conferences that very few students had used the

recommendation facility. The responses to the open questions in the surveys

shed some light on students' reactions. To some extent, the problem was a

lack of critical mass:

"Voting is a good idea, but I guess people didn't really start using

it much, and I never quite got round to it. Could be very helpful."

But some students seemed to be uncomfortable with the idea:

"I didn't want to rely on others' views about how important

messages were, so I didn't vote, or use the voting figures."

"I didn't recommend anything because my interests and views on

relevance relate to my needs and there's too little time in a 12

week course to know enough about others to develop the brass

neck to tell them what to read".

4.7 Findings on filtering

The third set of feedback questions included one asking 'Were the message

filtering options (All, Unread, Recent, Recommended) helpful?'. The results

are summarised in Table 4.11

Helpful	41%
Not particularly helpful	19%
Did not use	40%

Table 4.11   Views on filtering

A second feedback question asked students 'Which of the filtering options

did you use?'. The results are given in Table 4.12

Generally used 'All'	19%
Generally used 'Unread'	9%
Generally used 'Recent'	1%
Generally used 'Recommended'	0%
Varied	16%
Left at default setting	55%

Table 4.12   Filtering options used

The default filter setting was 'All', so these results show that a majority of

students did not generally filter out any messages. The filter setting which

was most used was 'Unread'.

Survey comments indicated students' views that filtering facilities were only

needed for very large numbers of messages:

"I didn't use this much, as the message volume didn't warrant it"

"I found this when the number of messages got too many to

handle."

Students' comments confirmed that the 'Unread' option was the most

popular:

"The unread option was handy at times - I didn't use the other

filters."

Comments also indicated some students' concern about losing the context of

the discussion if messages were filtered out:

"I often return to an earlier message to see the context of a

response, so don't want to hide them."

4.8 Findings on the clippings facility

The feedback questions included one asking 'Was the Clippings facility

helpful?'. The results are summarised in Table 4.13

Helpful	28%
Not particularly helpful	14%
Did not use	58%

Table 4.13   Views on clippings

Responses to the open questions in the surveys suggest that the low usage

was because students forgot about the facility, rather than feeling that it was

not useful:

"Good idea - wish I'd remembered to use it more often!"

However, several students commented that they would like clipped messages to be stored on their own computer, rather than on the conferencing system server:

> "I did use it, and it was helpful, but I would prefer to have a copy of the messages on my own computer so that I can delete unwanted [messages], and keep those I want with general points for as long as I need."

5. Discussion of findings on overload

5.1 Perceptions of overload

The results from the feedback questions and surveys provided information on whether overload was a problem to TT380 students. Many students had experienced overload when using group communication systems previously, and students felt similarly overloaded during the first part of the course, when they were using the 'basic' version of the prototype system. However, during the second part of the course, when using the 'enhanced version, only a minority of students felt overloaded. During the second part of the course, students also spent less time in the conferences, even though there were more messages to read. These findings could indicate that the features in the 'enhanced' version of the system helped students to be more efficient in their use of conferencing.

However, the data could also be explained in other ways. Students might have become more skilled at using conferencing, and hence felt less overloaded and needed to spend less time. Alternatively, the students who

felt most overloaded may have withdrawn from the conferences and not answered the later feedback questions. As Paloff and Pratt (1999, p. 50) point out,

> 'A typical reaction to overload is to retreat. If a student disappears from an online class, overload may be a culprit.'

Feelings of overload seemed mainly to be evoked by seeing large numbers of unread messages. This may be translated, in students' minds, into being faced with a lot of work to do. There seemed to be little change between the proportions of messages students read during the first and second parts of the course, with 12-15% of students reading all the messages. As Hiltz and Turoff (1985, p. 683) point out, some students:

> 'feel compelled to observe all the communications they can access in order to maintain confidence that nothing relevant is being overlooked'.

5.2 Features for message threading

The two-stage research design had benefits for the investigation of threading. Having students use the basic system (with linear threading) and then move on to the enhanced system (with branched threading) meant that all students had the opportunity to experience both ways of dealing with threading, each over a period of several weeks. When asked their views on the two approaches, students were able to comment from a firm basis, and they expressed a clear preference for a branched threading display. The metaphor several students used to explain their preference was that of a

conversation. They thought of a thread as a dialogue among a group of people, with each contributor responding to another individual's comment. The branched threading display allowed them to see which comment responded to which, and hence to follow the logical progression of different 'strands' of the conversation. Most students were also in favour of separating out threads from each other. Again this approach was seen as helpful in organising the messages, so that those on a specific topic were kept together.

Students varied in their reaction to giving their own title when submitting a new message to an existing thread. Although most students could see the benefit in having extra information on the content of a message, some seemed to be firmly against the idea as a matter of principle. These students expressed their views in the conferences, as well as in the feedback questions and surveys. It seemed that some students who were experienced users of newsgroups or other discussion environments thought that giving a new title to each message in a thread was in conflict with accepted custom and practise. This finding illustrates a general point which has emerged from the research. Users' experience of other systems has a strong influence on which features of a system they use and on their views about new features.

5.3 Recommending and filtering messages

When considering possible features to evaluate in the prototype system, the idea of students rating or recommending messages for each other had seemed attractive. Combining recommendations with a filtering facility seemed a good way to "sort the wheat from the chaff". However, in practice

the recommendation facility was hardly used. Part of the problem was generating enough recommendations initially to give some value for users. Until there are significant numbers of recommendations it is difficult to make use of those that exist, and it is certainly not helpful to apply filtering based on such small numbers of recommendations (Konstan et al., 1997). This issue of motivating students to recommend messages had been given some thought when designing the prototype system. Care was taken to ensure that the process, and the words used, should be seen as positive rather than negative. The process was also made as simple as possible: recommending a message was just a case of clicking on a single link at the end of the message text.

Students' comments in the surveys showed that their unwillingness to use this feature was not just because of lack of critical mass. There seemed to be the feeling among students that the usefulness of a message was a very personal thing. A message that one student found useful would not necessarily be useful for someone else. Students felt that, without knowing each other better, they could not provide helpful recommendations to each other, and would feel unhappy trying to do so. There is also a possibility that students do not like the idea of making judgements on each others' inputs. Although no students actually expressed this view, experience of peer review and assessment suggests that students are uncomfortable judging each others' work, particularly via an online medium (Kear, 2004; Prins et al., 2005). In relation to rating contributions, Preece (2001, p. 351) suggests that:

'There are good reasons to be concerned about employing such schemes in online communities. What happens if people feel their contributions are not valued? Do they become disheartened and leave?'

Perhaps students felt similar concerns.

Because recommendations were rarely given, filtering by recommendation was barely used. The other filtering options – by the age of the message and by whether the user had read it –were used to some extent, but not very widely. It seemed that students only saw the need for these facilities with very large numbers of messages. Their perception was that in TT380 the number of messages did not warrant the use of filtering. The filtering option that students seemed to consider most useful was 'Unread', which filters out messages that the user has already read. This was surprising, given that unread messages are already indicated using a 'red flag' icon. It appears that filtering out messages which have already been read is more effective than simply highlighting those that have not been read. This suggests that overload is a matter of perception for users. Being faced with large numbers of messages on the screen is daunting, even if the work of reading some of the messages has already been done. If some of the messages can be justifiably filtered out (because they have already been read) the perception of workload may be reduced. This argument can perhaps be extended to explain why the 'Recent' filter (which filters out messages more than a week old) was judged as less useful. Students may feel that they cannot justify

filtering out older messages, because they still ought to read or review them at some point.

5.4 Recording useful messages

Lack of use was also an issue in relation to the facility for 'clipping' messages. Although many students said that they considered this feature helpful, most students did not use it. Judging from some of the survey comments, part of the reason was that students simply forgot about it. Clipping (or its equivalent) is rarely a feature in modern conferencing systems, so students may not have registered that a clipping facility was available. This underlines the difficulty of evaluating new system features with users who are already familiar with the features of existing systems. As McAteer et al. (1997, p. 226) point out,

> 'students, teachers and resources all have a history that affects individual behaviour'".

The general issue of new features not staying within the 'field of view' may have been exacerbated by the two-stage research design. Students had spent several weeks using the 'basic' version of the system, which did not have the clippings facility or the recommendation or filtering facilities. These features were not there during the crucial stage when students were learning to use the system, and getting used to working within it. So perhaps it is not surprising that when the transition was made to the 'enhanced' system, most students just carried on with the familiar methods that they had already

established. Their main priority would be to keep up with their study of the course, rather than spending time experimenting with new features.

The comments from the surveys did, however, highlight another aspect which could have contributed to the lack of use of the clippings facility. Students would have preferred the clipped messages to be stored on their own computer, rather than on the conferencing system server. One issue was that of availability: to access a clipped message it was necessary to connect to the internet and log into the conferencing system. This was not always possible or convenient, particularly for students who did not have a broadband connection. The second issue was permanency: because the clipped messages were stored within the conferencing system, students realised that they would not have access to them once the course was finished. This was important, especially for such a short course, because some messages contained information or advice that students wanted to be able to refer to in the future.

6. Conclusions from investigation of overload

The research reported in this chapter has investigated further the issue of information overload in educational CMC systems, and has explored CMC system features which might address the problem of overload. Several conclusions can be drawn about:

- perceptions of overload;

- the system features which were evaluated;

- the research methods employed for the investigation.

Students reported experiencing overload when using CMC in contexts other than TT380, particularly in other courses. However, overload did not seem to be a serious problem in TT380. Students felt less overloaded in the second part of the course, when they were using the 'enhanced' version of the conferencing system. This may indicate that the new features were helpful, but it could also be because students became more confident with the course and the conferencing environment. Overload may be a matter of perception, related to students' levels of experience in using CMC.

The investigation of system features had mixed results. Some features were received very favourably by students, while others were hardly used. One clear research finding was in relation to threading. A large majority of students preferred a branched threading display over chronological threading. Students were also in favour of separating out threads from each other, and most students saw the benefit of having a new title for each message in a thread.

The facility for recommending messages was not successful in TT380. In the context of a 12-week course, students did not know each other well enough to feel confident recommending messages. They felt that the value of a message would vary from one person to another. Possibly they were also uncomfortable making a judgement on a fellow student's contribution, as this could be viewed as counter to the supportive ethos of educational conferencing.

Because recommendations were hardly used, it was not helpful to filter messages by recommendation, so this facility was not used. The other filtering options were used by some students, with the 'Unread' filter viewed as the most useful. The clippings facility was considered to be helpful in principle, but again not widely used. This was partly because students would have preferred to have a record of the messages stored on their own computer.

There was a general problem for the research, in that many students did not use the new features. It appears that students adopt a strategic approach, where they use the essential features, with which many students are already familiar, but do not explore any additional ones. The problem of lack of use may have been exacerbated by the two-stage research design. Students perhaps settled into a mode of use when working in the 'basic' system, and did not change this when the features in the 'enhanced' system became available. It was therefore decided that for the next phase of the prototyping work, new features would be in the system from the start, rather than comparing versions of the system with and without the new features. This next phase, which investigated system features aimed at enhancing social presence, is discussed in the following chapter.

Chapter 5

Prototyping to enhance social presence

The previous chapter focused on one of the major themes which emerged from interviews with users: information overload. The second major theme from these interviews was social presence. Although this term was not used by interviewees, many of their concerns revolved around the concept of social presence. Issues which were mentioned included:

- the need for students to get to know something about each other;

- the problem of time lags between messages;

- the benefits of knowing who's online, and of real-time chat.

Based on these findings, it seemed likely that social presence would be enhanced by more widespread use of résumés and by a synchronous communication facility. The next part of the research therefore focused on the evaluation of these two system features. For this phase of the work the features to be evaluated were included in the system from the start of the course, rather than being provided to students part way through.

1. Investigating features to enhance social presence

1.1 Investigating résumés

In the interviews, OU students and tutors had expressed a wish that more students would use the résumé feature of FirstClass. The view was that this would help students get to know each other, and would therefore ease communication. One student suggested that résumés should be compulsory, and another suggested that users should be prompted to complete a résumé. The use of résumés (often called 'profiles') is in line with practice advocated in the literature on online communication and learning. For example, Kim (2000, p. 84) states:

> 'profiles will help foster trusting relationships between your members by providing context and promoting accountability.'

On this basis, Barab et al. (2003) used member profiles within their Inquiry Learning Forum:

> 'the ILF encourages its members to create and edit their member profiles so other ILF members can learn more about one another. This enables ILF members to control how they are perceived by others within the community, and ideally these profiles help ILF members to decide who they want to communicate with and how they might interpret statements or attitudes of others (Kim, 2000).'
> (p. 248)

Similarly Bonk et al. (2001, p. 81) explain that, when using the 'Smartweb' system, students are asked to write information, such as their hobbies, where they live and their computer experience, into their student profile. The WebWho educational communication tool, discussed by Hard Af Segerstand & Ljungstrand (2000), includes an online 'student catalog' with photos and contact information, together with access to the students' home pages.

Zimmer et al. (2000), in their discussion of building online learning communities, advise that:

> 'Socialisation can be enabled by setting up the community in a way that allows individuals to gain an understanding of who is addressing them in what can be an impersonal textual environment. This could include: photos, résumés and biographies and general introductions to the online group.'

The suggestion to prompt students to create a résumé was therefore implemented in the Message Forums system. When a user first logs into the system they are prompted to enter some information into their résumé. The prompt explains that this will be helpful to other users.

Figure 5.1 (a) shows the entry form for adding information to a résumé, and Figure 5.1 (b) shows the résumé as seen by other users.
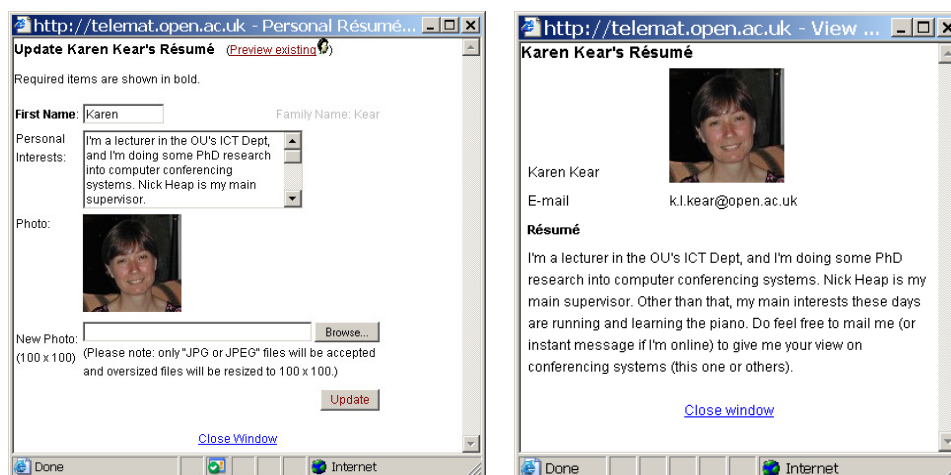
Figure 5.1 (a) The résumé update form   **(b) A résumé as seen by other users**

The possibility of using a structured format, with fields for different kinds of information (for example, courses studied, interests, area of work) was considered, but on balance, an open format seemed likely to be more acceptable to students. The only obligatory item in a Message Forums résumé is the user's first name. The user's email address is only shown if they choose to make it public.

There is also a facility for adding a photograph, again as advocated in the literature. Mason & Bachsich (1998, p. 255) reported the use of photos in résumés:

> 'so that users can remind themselves of the person who has sent a particular message'.

Kim (2000, p. 100) suggested:

> 'Text-based personal profiles are good - and necessary for a searchable member directory - but you may also want to include

images to help your members express their identity in a more

immediate way.'

Nicol et al. (2003, p. 273) described a system used by the Open University

of Catalonia, where:

'each online contribution is accompanied by a digitized thumbnail

picture of the sender in order to personalize contributions with a

social reference.'

The Moodle Virtual Learning Environment adopts a similar approach, with

messages including a photo or image representing the sender (see Figure

5.2).
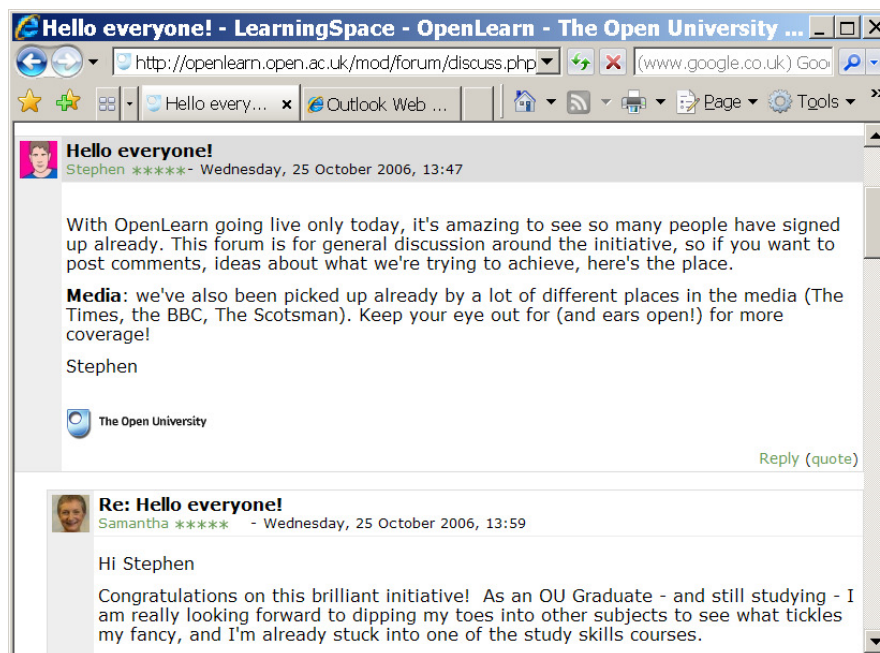
Figure 5.2   **Messages in a Moodle forum, with images representing the senders**

Ingram et al. (2000), discussing synchronous communication, also advocate

the use of small photographs of participants, in order to help sustain

communication. Song et al. (2004) reported that the use of photographs

helped community formation in an online course which had an initial face-to-face meeting.

In the student interviews, one suggestion made was that there should be a way to tell if a user has a résumé. This idea was implemented in the Message Forums system. If a user has information in their résumé, a small icon representing a face is displayed next to their name at the top of each message they post. Other users can click on this icon to view the résumé (see Figure 5.3) .
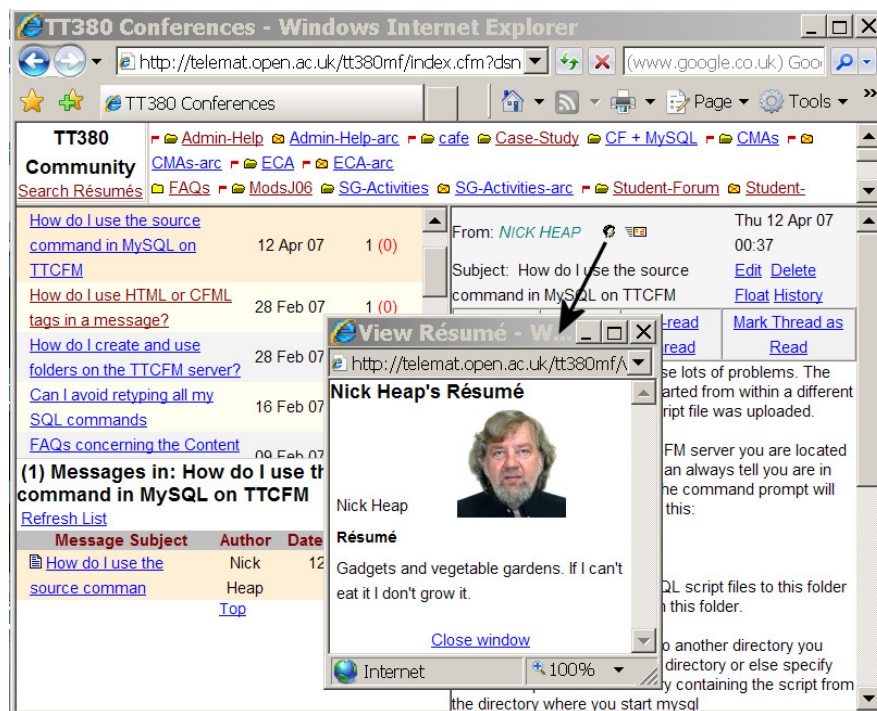
Figure 5.3   Clicking on the icon to view a résumé

Clickable résumé icons are also displayed against users' names in the window showing which users are currently logged into the system (see

below). A free-text search of all résumés can be carried out, for example to find other users with common interests or experience.

1.2 Investigating instant messaging

Judging from the interviews with students and teachers, synchronous communication was seen as potentially beneficial. The FirstClass synchronous chat facility was valued by OU students and teachers, and teachers at other universities were interested in using synchronous communication tools. OU students would have liked a 'buddies' facility, so that they could easily see which members of their tutor-group or project group were online. It therefore seemed likely that a synchronous communication facility might help students get to know each other better, and contribute to a sense of community. Again, this is supported by the literature on online learning. McInnerney and Roberts (2004) suggested that, with synchronous communication,

> "a sense of social presence develops that often leads to a greater sense of community." (p. 75)

Nicholson (2002, p. 363) claimed that instant messaging

> 'can serve to provide a stronger sense of community in the solitude of asynchronous online course work'.

When considering what kind of synchronous communication facility to implement in the prototype conferencing system, two questions were considered:

- should the communication be one-to-one, or should it be multi-user?

- should a 'buddies' facility be provided?

The students interviewed earlier had experienced the FirstClass chat facility, which can handle more than two users. This could have been beneficial in the TT380 course if a conference moderator wished to host a scheduled synchronous session for students. However, TT380 does not have any groupings of students (such as tutor-groups or project groups) so student-initiated chat sessions would be less likely to take place. A 'buddies' facility has the advantage of identifying when specified users are online, but given the lack of student groupings, it was not clear that there would be any advantage in this to TT380 students. Moreover, there would probably only be a few users online at any given time, so it would be easy to pick out names of particular people from a list of all users who were currently online.

The approach adopted was therefore to implement a one-to-one instant messaging facility, within the Message Forums system, which maintains a list of all users who are logged in. A small frame in the top-left of the browser window is frequently updated to show the number of users who are logged in. Clicking a link in this window opens a small pop-up window, again frequently updated, which lists these users (see Figure 5.4). If one of the users is logged in but inactive (perhaps they are away from their computer), the system detects this and shows a red cross against their name.

Figure 5.4   List of users who are logged in (with red cross if logged in but inactive)

If a user wishes to initiate an instant messaging session with one of the
online users, they simply click on the speech bubble icon next to that
person's name. This alerts the recipient, and offers three possible response
options:

- accept the instant message request;

- decline this particular instant message request;

- decline all instant message requests during this conferencing session.

These options allow users some control over possible interruptions.

2. Gathering data on social presence

The résumé and instant messaging facilities were evaluated in the third and
fourth presentations of TT380. The third presentation started in October
2005 and the fourth started in February 2006. As before, data was gathered
from students via feedback questions appended to the assignments and via
online surveys. However, in contrast to the approach adopted for the
overload study, the new features in the social presence study (résumés and
instant messaging) were available from the start. The course conferences

were used as an additional data gathering route (see later). Using these

various methods, students were asked about:

- their use of résumés, and their views on whether these were helpful;

- their use of the instant messaging facility, and their views on

  whether it was helpful.

Students were also asked questions to ascertain their views on computer-

mediated communication and online community. This was to provide

context for their answers to questions about résumés and instant messaging.

2.1 Data from the October 2005 presentation

Feedback questions were appended to the second assignment of the October

2005 presentation. This was in week 7 of the 12-week course, after students

had been using the prototype conferencing system for 5 weeks (see Table

5.1).

Week	Use of conferencing	Assignments and data gathering
1	Start using FirstClass	
2		
3	Change to use Message Forums	
4		Assignment 1
5		
6		
7		Assignment 2, with feedback questions
8		
9		
10		Assignment 3
11		
12		End of course assessment. Online survey.

Table 5.1   Schedule for data gathering in the October 2005 presentation

92 of the 110 registered students submitted this assignment, and between 69% and 74% of them answered the feedback questions (see Table 5.2). As before, the number of students responding varied between questions. The data from the October feedback questions is given in Appendix 5A.

	Students submitting the assignment	Percentages completing the feedback questions
Second assignment	92	69 -74%

Table 5.2   Numbers of respondents to feedback questions

A link to an online survey containing both closed and open questions was added to the Message Forums system towards the end of the October presentation. In the conferences students were encouraged to complete the survey, but only 18 students did so. The data from the survey is given in Appendix 5B. Because of the low response rate, the quantitative data from the survey may be unrepresentative of the whole student cohort. Therefore this data is not used in the analysis presented here (although it is included in Appendix 5B). However students' comments from the open questions are included in this chapter as illustrations.

2.2 Data from the February 2006 presentation

Feedback questions were appended to the first and second assignments of the February 2006 presentation. The first assignment was 4 weeks into the course, when students had been using the prototype conferencing system for 3 weeks. The second assignment was 7 weeks into the course, when students had been using the system for 5 weeks (see Table 5.3).

Week	Use of conferencing	Assignments and data gathering
1	Start using FirstClass	
2		
3	Change to Message Forums	
4		Assignment 1, with first set of feedback questions
5		
6		
7		Assignment 2, with second set of feedback questions
8		
9		
10		Assignment 3
11		
12		End of course assessment. Online survey and questions in conference.

Table 5.3   Schedule for data gathering in the February 2006 presentation

Table 5.4 (second column) shows how many of the 195 registered students

submitted each of the assignments. The third column gives the percentages

of those submitting each assignment who also answered the feedback

questions. The data from the February feedback questions is given in

Appendix 5C.

	Students submitting the assignment	Percentages completing the feedback questions
First assignment	182	87%
Second assignment	170	69-71%

Table 5.4   Numbers of respondents to feedback questions

Towards the end of the course an online survey containing entirely open

questions was made available via an additional link in the conferencing

system. To provide an alternative response route and encourage more

responses, the same questions were posted as threads in one of the course

conferences. This latter approach was similar to a focus group in that

students could see each others' responses, and build on others' ideas.

Students were invited to respond either in the conference, by email or by

completing the survey, and it was made clear to students that only the survey

would provide anonymity. Twelve students responded via the conference

threads and two responded via the survey. No students responded via email.

The combined data from the conference and survey responses is given in

Appendix 5D.

3. Results from feedback questions and surveys

This section summarises the findings from the two course presentations. The

results are given in a number of sections concerning:

- putting information into résumés;

- reading others' résumés;

- prior experience of synchronous communication;

- using instant messaging in TT380;

- views on online community.

3.1 Putting information into résumés

In the assignment feedback questions for both course presentations students

were asked 'Did you put any information into your résumé?'. For the

October 2005 presentation this question was appended to the second

assignment (as were all the feedback questions). The responses for the

October presentation are given in Table 5.5, as a percentage of those

students answering the question. 65% of respondents said they had put some information into their résumé.

Yes, quite a lot	8%
Yes, a bit	57%
No	35%

Table 5.5 **Posting information to résumés (October 2005 presentation)**

For the February 2006 presentation the question was asked earlier, with the first assignment, (to encourage students to put information into their resume if they had not already done so). Different response options were used in order to ascertain what kind of information students were providing. The results are given in Table 5.6.

I included information about family/hobbies	38%
I included information about my work	18%
I included information about my studies	22%
No, I did not put any information about myself into my résumé	49%

Table 5.6 **Type of information posted in résumés (February 2006 presentation)**

Only 51% of the February presentation students reported putting some information into their résumé, possibly because the question was asked earlier in the course. Mainly students seemed to include information about social aspects, rather than work or study.

Although students were prompted to put information into their résumé when they first registered in the conferencing system, it is clear that many students did not do so. The feedback questions for both presentations included a question asking 'If you did not put information into your résumé, why was this?'. The responses are given in Table 5.7, as percentages of those

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answering the question. Students could select more than one option if they wished.

	October presentation	February presentation
I couldn't see any reason to	38%	23%
It would take too long	15%	16%
I didn't get round to it	23%	58%
I don't want others to have personal information about me	23%	12%
I didn't know what to write	n/a	19%
Some other reason	35%	5%

Table 5.7   Reasons for not putting information into résumés

The option 'I didn't know what to write' was added for the February presentation. It may correspond to one of the 'other reasons' which 35% of the October respondents indicated. Responses to the open questions in the surveys gave some further indications of why some students did not put information into their résumé. Some were uncertain about what to write:

> "I think people are put off by thinking 'I don't have anything interesting to say about myself' hence they don't write anything."

Others did not want to provide information about themselves:

> "Nice to have, but it should be optional as many people like to maintain their privacy and anonymity."

3.2 Reading others' résumés

In both presentations students were asked about reading others' résumés. For the October presentation, one of the feedback questions asked 'Have you looked at other students' résumés?'. This question was appended to the second assignment, as were all the questions for this presentation. The

results, given in Table 5.8, show that 51% of respondents said they had looked at other students' résumés.

No	49%
Yes, one or two	39%
Yes, quite a few	12%

Table 5.8   Looking at others' résumés (October)

For the February presentation a slightly different question (appended to the first assignment) was asked: 'Have you looked at other users' résumés?'. This version of the question included looking at the résumés of course moderators as well as of other students. The question also used different response options in order to find out how students used résumés. The results, given in Table 5.9, show that 43% of respondents reported looking at résumés. This is lower than for the October presentation, possibly because the question was asked earlier in the course. As Table 5.9 shows, when students did look at résumés, it was mainly to find out something about a student who had posted a message.

I looked at the résumés of some students who had posted messages	30%
I looked at the résumés of some students who were online	17%
I looked at the résumé of one or more conference moderators	11%
I searched the résumés	17%
I didn't look at any other users' résumés	57%

Table 5.9   Looking at others' résumés (February)

Further feedback questions on résumés were appended to the second assignment for the February presentation. Students were asked 'Did you find it helpful to have other students' résumés available?'. The responses, given in Table 5.10, show that just under a third of respondents found résumés helpful.

Yes, very	0%
Yes, fairly	31%
No, not particularly	48%
No, not at all	21%

Table 5.10   Helpfulness of having résumés available

Students were also asked 'Did reading other students' résumés help you feel that you knew them better?'. The responses, given in Table 5.11, show that just over a third of respondents felt they knew others better through reading their résumés.

Yes, definitely	6%
Yes, somewhat	30%
No, not particularly	32%
No, not at all	1%
I didn't read any résumés	31%

Table 5.11   Knowing others from their résumés

Students' comments to the open questions in the surveys gave a range of views on the usefulness of résumés. Some students commented that résumés:

"gave an idea of where people were coming from"

and helped to

"get a sense of who you are talking to".

But some students felt that reading other people's messages was a better way of getting to know them:

"I think we should be left to learn about each other in a more natural way over a period of time, rather than learning it from a résumé, which only tells us what the person wants us to know."

The Message Forums system included a facility for a user to add a photo to their résumé. The February presentation students were asked 'Do you think it is helpful to have photos, or other visual representations of users, in résumés? The results are given in Table 5.12.

Yes, very	1%
Yes, fairly	31%
No, not particularly	42%
No, not at all	16%
I'm not sure	10%

Table 5.12   Helpfulness of photos in résumés

Again, about a third of the respondents found photos etc. helpful. There were not many comments on this aspect in the responses to the survey. In response to an open question on résumés, one student said that it was:

"helpful to place an image (or written description) of an individual against their comments."

However, another student commented that:

"you can't gain much from just a few lines of text and a photo."

3.3 Prior experience of synchronous communication

The feedback questions for both presentations asked students about their prior experience of synchronous communication. The October presentation students were asked 'Had you used an instant messaging system before

starting TT380?'. The results, given in Table 5.13, show that most students had.

Yes, often	57%
Yes, once or twice	26%
No	17%

Table 5.13   Prior experience of instant messaging (October 2005 presentation)

Students from the October presentation were also asked 'Had you used a synchronous (real-time) chat system before starting TT380?'. The results, given in Table 5.14, show that most students had used a chat system - and not just the FirstClass Chat facility.

Yes	71%
Yes, but only in FirstClass	7%
No	22%

Table 5.14   Prior experience of synchronous chat (October 2005 presentation)

For the February presentation (in order to minimise the demands on students) the questions were combined, to ask: 'Had you used a synchronous communication facility (e.g. instant messaging or real-time chat) before starting TT380?'. Table 5.15 shows that 76% of students had prior experience of synchronous communication.

Yes, often	41%
Yes, once or twice	35%
No	24%

Table 5.15   Prior experience of synchronous communication (February 2006 presentation)

In both presentations the majority of students had experience of synchronous communication. However, in the February presentation only 41% of the respondents had used synchronous communication tools 'often'. This can be compared to 57% of the October presentation respondents who had used

instant messaging often. So it appears that the February presentation students had less experience of synchronous communication.

3.4 Using instant messaging in the course

In both presentations, students were asked whether they had used the TT380 instant messaging facility. For the October presentation the question was appended to the second assignment, but for the February presentation it was asked earlier, with the first assignment (to encourage students to try the facility if they had not done so already). The results are given in Table 5.16.

	October presentation	February presentation
Yes, often	3%	2%
Yes, once or twice	25%	7%
No	72%	91%

Table 5.16   Use of TT380 instant messaging

These results suggest that the instant messaging facility was not used very much in either course presentation.

A feedback question for the October presentation asked: 'If you have not used the instant messaging facility, why was this?'. The results are given in Table 5.17. Students could select more than one option if they wished.

I couldn't see any reason to	35%
I didn't get round to it	21%
I didn't find many people online when I was connected	13%
I don't want to contact people I don't know	12%
I didn't know about it	12%
Some other reason	17%

Table 5.17   Reasons for not using instant messaging

From this data, there does not seem to be any single, clear reason for the lack of use, though students' comments in the online surveys give some

indications. Some students found that there weren't enough people online at any given time:

> "in general it was not helpful as there were too few people around when I looked - normally only one or two people."

Others experienced technical problems, such as pop-up blocking of alert messages. This meant that when students initiated an instant messaging session they might gain no response at all because the recipient could not see the popup alert window.

Some students were unwilling to use the instant messaging facility because they did not know others on the course:

> "I hesitate to message people who are essentially strangers, merely names on a screen."

Other students were against instant messaging on principle, seeing it as intrusive.

There were a few positive comments about instant messaging, but even these were rather uncertain in tone:

> "useful for immediate private contact, I suppose. I find that conferencing and emails already do the job".

It seems that most students did not want to contact each other via instant messaging. However, when asked (in the February presentation survey)

whether it was helpful to see that other students were online, several

respondents responded positively:

"It engenders a feeling of study going on, each of us in our booths

keeping quiet in the university library sort of thing".

This facility seemed to give some students a feeling of reassurance:

"it implies I'm not the only one following the course, or the only

one who works at that time."

3.5 Views on online community

In the October presentation's feedback questions students were asked: 'Is

online contact with other students on the course important to you?'. For the

February presentation the feedback questions included a similar question.

The results are shown in Table 5.18.

	October presentation	February presentation
Yes, very	12%	30%
Yes, fairly	41%	39%
No, not really	34%	25%
No, not at all	13%	6%

Table 5.18   Importance of online contact

As Table 5.18 shows, 53% of the October presentation respondents thought

that online contact was important, and the corresponding figure for the

February presentation was 69%.

Both presentations' feedback questions also asked students whether it was

important to feel part of a community on the course they were studying. The

results are given in Table 5.19.

	October presentation	February presentation
Yes, very	10%	11%
Yes, fairly	29%	40%
No, not really	42%	29%
No, not at all	16%	17%
Not sure	3%	3%

Table 5.19   Importance of community

As Table 5.19 shows, 39% of the October presentation respondents and 51%
of the February presentation respondents reported that community was
important to them. In the survey for the February presentation, students were
asked again about this aspect. Students' responses differed widely, and some
students were uncertain:

> "I'm not sure about 'important' but it certainly has been helpful to
> have peer opinions, sometimes fun and, yes, sometimes
> distracting."

A major benefit was seen as increasing motivation:

> "Yes, it helps to realise that others are in the same boat."

But some students felt that it was difficult or impossible to experience
community online:

> "never having met the other students you cannot be part of a
> community."

In both presentations' feedback questions, students were asked whether they
thought synchronous communication facilities in a course conferencing

system could help create a sense of community. The result are given in Table 5.20

	October presentation	February presentation
Yes, considerably	15%	15%
Yes, somewhat	59%	49%
Not really	10%	20%
No	4%	4%
Not sure	12%	12%

Table 5.20   Helpfulness of synchronous communication for sense of community

74% of respondents in the October presentation, and 64% in the February presentation, thought that synchronous facilities could help to create community. In one of the questions for the February presentation survey, students were asked whether they thought asynchronous or synchronous communication was better for gaining a sense of community. Again students' views varied, but many seemed to favour asynchronous conferencing:

> "I prefer the conference idea - it gives time to read, absorb, check things out, compose replies ... that's for the serious curricular stuff; the instant messaging is handy to have for those who are available and have time for ad hoc, extra-curricular, maybe fun stuff".

4. Discussion of findings on social presence

The research reported in this chapter investigated possibilities for enhancing students' sense of social presence, so that online communication with others students would feel more comfortable and natural. Two system features were investigated for this purpose: résumés and instant messaging. Students' responses to these facilities, and their views on the general issue of online community, are discussed below.

4.1 Résumés

Many online learning educators and researchers advocate the use of résumés (more often described as user profiles) for enhancing social presence. However, there seems to be little published research on whether students actually feel the need for these, or find them helpful. The research reported here suggests that résumés are important to some students, but not to the majority.

In spite of the early encouragement to write something in their résumé, many students did not do so. In some cases students made an active decision not to post any information to their résumé, for reasons of privacy. In other cases students were uncertain about what to write. Perhaps a more structured format for the résumé, or some guidance, would have been helpful. In the main, when students did not write anything, it seemed to be because they could not see any reason to do so. One student explained:

> "To be honest, I don't usually write anything because I don't look
> at other people's much."

About half the students looked at others' résumés. Mainly, students read résumés of others who had posted messages. In the Message Forums system this is easy to do - the user just clicks the résumé icon next to the name of the person at the top of their message (see Figure 5.3 in Section 1.1). About a third of the students found résumés helpful. One student said:

> "It's not vital, but I think it could help if everyone put something up, even if it's their location, town, county or country even."

Only about a third of the students felt that reading résumés helped them to know other students better. One student commented:

> "what one might want to know - if anything - can be deduced from conference posts."

Several students expressed this view, which is in line with Haythornthwaite's (2000) claim that students using course discussion boards gradually learn more about others from the content and the style of their messages.

Having photos in résumés elicited a similar response from students, with only a third of respondents finding them useful. One student joked:

> "Pictures? - might be useful if you want to have a dating site sideline ;-))".

Given that many CMC practitioners advocate the use of member photos (e.g. Mason & Bachsich, 1998; Kim, 2000) it was surprising that students did not respond more positively to this facility. However, other researchers

have found negative, as well as positive, effects from member photos. Cress (2005) found that member portraits, consisting of photos and short descriptions, had a positive effect on group interaction for some members of online groups (those who were more individually oriented) and a negative effect for others (those who were more group-oriented). Tanis & Postmes (2007) found that the member photos and names had a positive effect on interpersonal perceptions, but a negative effect on participants' satisfaction with the online interactions. In both these studies, the authors suggest that member portraits can reduce participants' sense of solidarity.

The fact that most TT380 students did not consider résumés helpful may partly explain why many did not write anything in their own résumés. However, this situation could be a vicious circle, as one student suggested:

> "Résumés are only helpful if everyone on the course writes something, anything about themselves."

Perhaps the low use of résumés was partly because students were new to the conferencing system and did not manage to explore the various features during the few weeks in which they were using it. One student commented:

> "I haven't looked at the résumés (or any photos) this time, but maybe that is something that I might do in the future".

4.2 Instant messaging

Use of instant messaging

In spite of the fact that most users had prior experience of synchronous communication, the instant messaging facility was not used a great deal. Mainly, students did not feel the need for this form of communication in the course, or simply did not get around to it. For some students, instant messaging was seen as a potential distraction or interruption in a busy study schedule. This is consistent with Matthews & Schrum's (2003) finding that social use of instant messaging was a distraction to students, which could have a negative affect on their studies. One or two students were strident in their reactions to the introduction of an instant messaging facility :

> "instant messaging systems are a curse. Their use is banned in my company. I would think twice about studying any course where its use is compulsory".

Several students seemed to feel that they did not know each other well enough to make contact via instant messaging:

> "I have not used this service as I do not know anyone on the course and would not wish to converse with a stranger."

This is consistent with the findings of Hrastinski (2006) that distance learners did not make use of instant messaging because they had never met each other and did not want to interact socially. It is also in agreement with Nicholson's (2002) finding that some students were nervous about using instant messaging with other students that they did not know well.

TT380 students felt even more uncomfortable when they tried to make

contact via instant messaging and received no response:

"I tried it once, but didn't get a reply, so was too embarrassed at

intruding."

One student, who was clearly conscious of the problem, suggested:

"you should also be able to mask your presence so that you don't

offend people who may try to engage you in a conversation when

you don't have time or simply don't want to."

The two problems of lack of response and interruption are related. They

raise the issue of whether instant messaging is perceived as a purely

synchronous communication tool. If it is, then the sender will expect an

immediate response and the recipient will feel obliged to provide one.

However Nardi et al. (2000) found that people often used instant messaging

asynchronously and in parallel with other tasks. Recipients decided whether

and when to respond to a message, and felt that they could ignore messages

without causing offence. This finding was also confirmed by Baron (2004)

in her study of instant messaging by college students.

Technical issues

The problem of lack of response to instant messages was partly caused by

technical issues related to operating in a web-based system. For example, if

the recipient's browser was set to block pop-up windows, they would

probably not know when they were being contacted. If the recipient saw the

pop-up window, but simply closed it, rather than using one of the IM

response options, the initiator would get no response at all.

A specific problem in the October presentation occurred if a user closed

their browser window without logging out of the system (quite a likely

event). The user would appear to be still in the system, but any attempt to

contact them would gain no response. A similar problem arose if a user was

logged in but away from their computer. For the February presentation the

system was modified to alleviate these problems by carrying out a continual

check for user activity.

Benefits of instant messaging

One student did see benefits from his own experience of the instant

messaging facility:

> "As the time progressed I came to use the facility more. It gives a
>
> more personal experience to have a real-time conversation with
>
> people one reads postings from."

This comment expresses clearly the benefit envisaged for synchronous

communication when planning this research. It is interesting to note that

time was needed for the benefit to become apparent.

One aspect of the instant messaging facility which students seemed to

appreciate was the ability to see who was online. Some students found this

knowledge reassuring, even if they had no desire to contact the other people.

One student used the metaphor of looking around a university library and

seeing that others were also studying. This seemed to strike a chord with other respondents:

> "seeing the times they work is interesting too. People have
>
> different patterns to their day and people like me have patterns
>
> like me."

It seems that awareness of the other people who are logged in can help to generate a feeling of solidarity or community which students find helpful. This feeling is created without the need for actual communication. This finding has been noted by other researchers (e.g. Nardi et al., 2004; Pascal, 2003). Contreras-Castillo et al. (2004) discovered that students felt more a part of the group from their awareness of other online users than from actually interacting with them. Haythornthwaite (2000) described how two students who regularly worked late at night discovered that they were often online at the same time, so they sent each other short email messages just to see 'Are you there?'. Judging from TT380 students' use of the library metaphor, a feeling of co-presence is created. So the concept of 'social presence' seems to apply here in the sense of making people feel closer together.

4.3 Online community

Is online community important?

Students were divided in their views about online community. However, in both presentations considerably more students thought online contact important than thought feelings of community important. The following comments from students illustrate their views:

> "I like to read what other students have to say about ongoing work and other things. I'm not too sure that this involves a sense of community."

> "In fact I use [FirstClass] quite a bit but I don't feel part of a 'community'."

Students made some very thoughtful comments about community, explaining why it was, or was not, important to them. A point made by several students was that it can help people to keep going when they are struggling:

> "I think it is important as it can provide an inspiration when lack of motivation is a problem."

One student clearly thought that community was important, both in a course context and beyond it:

> "Like most human beings I like to feel as though I'm part of the pack and as such I very much like to identify myself with others on the course. So yes it is for me very important that a course

offers a sense of community. All my courses with the OU have been online and I am in regular communication with fellow students from 2003, thanks to the [OU Students Association] suite of social conferences on [FirstClass]."

Other students were more uncertain. The comment below linked the idea of community to learning something about other people:

"Tricky question this ... the answer is yes and no. Was it important to me? Yes, because it's a shared learning experience and I tend to work better in a shared work experience. On this and other courses, I have learnt a heck of a lot by reading other posts and asking the odd question or three.

But does this equate to a sense of community? probably not ... it's a bit like a character in a book, film or soap opera ... if you care about a character (usually from learning more about them during the course of the film) you tend to feel for them ... but it is very difficult to 'feel' for someone based on a short résumé and a few messages."

Can online communication bring a sense of community?

Students were divided on whether a sense of community can arise in a purely online setting. Some students thought it could, others thought it was difficult and that it might depend on the individual. The following comment, though written in a light-hearted way, makes a serious point about the need

to know people in order to feel a sense of community. It also raises the issue of trust in online environments:

"Community implies social interaction which is usually based on face to face contact. Faces tell the whole story ... online messages or instant chat tell you nothing about the person. You can hide behind any disguise and no one will ever know. For example, in a résumé one could put that one is super fit and does triathlon races (as in mine) but how do you know that I do ... I could be a very large bloke with a liking for drinking vast quantities of beer, watching TV and pretending to be someone else in a chat room. And you would never know ... It is this 'not knowing' that inhibits a true sense of community.

One student made a connection between taking part in the shared learning of the course and feeling part of a course community:

"It does take time to feel part of a group of real people, not computer-generated answers. But it does happen, especially if you ask for and receive or give help."

Synchronous versus asynchronous communication

The majority of students in both course presentations thought that synchronous communication could help create a sense of community. One student commented:

"Any form of communication is required for this, but the more instant it is the better."

However when asked to compare synchronous and asynchronous communication for gaining a sense of community, most students seemed to favour asynchronous conferencing, because it fulfilled their needs and they felt more comfortable with it. One student summed up the benefits of each form of communication:

> "I think there is a place for both methods. The messenger for idle banter for those with an interest and the conference system for more considered and inclusive debate."

5. Conclusions from investigation of social presence

The research presented in this chapter has provided an indication of whether résumés and instant messaging can help enhance social presence. It has also shed some light on students' views about online community. Students varied in the value they placed on a sense of community in a course context, and held differing views on whether this was possible through online communication. Although many students were uncertain about online community, most felt it was important to have online contact with other students. Students thought that synchronous communication could help to enhance community, but most seemed to place more value on asynchronous conferencing.

The development of a sense of community was linked with a need to get to know other people, and some students thought that this was only possible face-to-face. Some felt that résumés could help, but several students expressed the view that reading people's messages was a better way to get to

know them. Although students felt that synchronous communication could contribute to community, not many felt that instant messaging was helpful in the context of TT380. This was partly because students were not comfortable contacting people they did not know. However, an awareness that others were online and working on the course was seen as helpful by some students.

The success of attempts to enhance social presence may depend on the course context and on individual students' perceptions. Many TT380 students did not make use of résumés or instant messaging. This perhaps indicates that, for most students on short technical courses, simply being able to contact other students about the course is enough.

Chapter 6

Conclusion

This chapter presents a summary and discussion of the research. The chapter begins by reviewing the aims of the research and the research questions. The main findings which emerged from user interviews and prototyping are then summarised. There follow some comments on the benefits and limitations of the research approach. This leads to a discussion of possible future research, and the chapter ends with a short statement of what the research has contributed to the area of computer-mediated communication for education.

1. Aims of the research

The context of the research was the use of computer-mediated communication in higher education. Based on social constructivist theories of learning, CMC is used in higher education to support discussion, perspective-sharing and collaborative work. However, the use of CMC is not without problems, and these act against the educational benefits.

Researchers have considered a number of aspects of educational CMC which can have an influence on its effectiveness. However there has been limited research on the specifics of the CMC systems used. The research reported here therefore aimed to investigate whether a closer focus on CMC system design could improve the experience of CMC for learners and teachers. In order to address this issue, two research questions were posed:

What benefits and problems do learners and teachers experience when using computer-mediated communication systems within the context of a university course?

To what extent can benefits to learners and teachers be increased, and problems reduced, by changes to the design of a CMC system?

The first research question was addressed primarily through interviews and observations with students, tutors, and teachers. The interviews revealed that all three groups see educational and practical benefits from CMC, but also experience problems and frustrations. Two major issues emerged from this stage of the research:

- the problem of information overload;

- the need to enhance social presence.

These two issues were used to focus investigations for the second stage of the research, which primarily addressed the second research question. Based on the interview findings, specific system features were identified which might address the issues. A prototype conferencing system was used to explore these features and evaluate them with students in an Open University course. This investigation was carried out as two prototyping studies: the first evaluating features aimed at alleviating overload; and the second evaluating features aimed at enhancing social presence. Quantitative and qualitative data was gathered from students at different stages during several course presentations.

2. Summary of the research findings

2.1 Findings from user interviews and observations

Findings from student interviews

The interviews with OU students revealed that they were concerned about value for time in relation to their use of CMC. They found that too much time was needed to find useful messages among the large volumes posted. This was partly because there were simply too many conferences and messages, and partly because it was difficult to pick out the messages which might be useful. However, students pointed out that threading of messages was helpful in following online 'conversations'.

Students also commented that asynchronous CMC was impersonal, leading to misunderstandings or poor relationships. Time lags were a further frustration which added to the sense of impersonality. For these reasons some students suggested that facilities for synchronous communication would be beneficial. They also reported that it was helpful to learn about each other via résumés. In terms of the general characteristics of a system, students felt that ease of use, a pleasant visual interface and user control were important issues.

Findings from tutor interviews

OU tutors were concerned about similar issues, mainly on behalf of their students. They felt that large numbers of messages were off-putting and could lead to withdrawal by students. They also noted that good threading tools, if used correctly, could help. In terms of educational and social factors, tutors felt that CMC helped overcome isolation, and could increase

motivation and retention. However they stressed that students could be put

off by the public nature of conferencing and by the tone of some messages.

To overcome these problems it was important that students got to know each

other. Tutors thought that synchronous communication might help, and they

were interested in exploring collaborative tools such as shared whiteboards.

Tutors wanted to create a welcoming set of conferences for their students,

and needed tools to manage conferences and messages. They also needed to

monitor students' activities, particularly at the start of a course, in order to

encourage participation.

Findings from teacher interviews

Teachers were primarily focused on the educational benefits of CMC, which

they felt were considerable. They thought that CMC could encourage a more

active approach to learning, and could provide valuable support and

preparation for face-to face sessions. They also saw CMC as helping to

build community among students and keep students in touch with each other

when away from the campus. Discussion forums were seen as key to these

aspects, but were also noted to cause significant problems for students in

navigating among the message threads. Together with other technical and

usability problems, these issues made some students unwilling to take part

in CMC. Another problem was the public and permanent nature of

asynchronous CMC, which students could find daunting. Many of the

teachers had tried synchronous chat with their students, but with mixed

results. Teachers identified the need for facilities to support their own online

work. They wanted flexible tools which would help them to: set up a

pleasing online environment; archive messages; monitor students' activities; and handle assessment.

Summary of findings from interviews

The interviews with users revealed many issues which were common to learners, tutors and teachers, providing a wealth of information relevant to the first research question:

What benefits and problems do learners and teachers experience when using computer-mediated communication systems within the context of a university course?

Users saw benefits in terms of learning through discussion, perspective sharing and peer support. There were opportunities to build connections and community among students, tutors and teachers, and to overcome practical difficulties of communication. However some significant problems and needs were identified. The two major issues were information overload and lack of social presence. Both these issues could lead to low participation among students. Other issues emerging from all three user groups related to usability, flexibility, and visual appearance. In addition, the interviews with tutors and teachers identified their needs in relation to managing students' online work.

2.2 Findings from prototyping studies

Having identified the main issues, the next stage of the research aimed to investigate whether these could be addressed by changes to a CMC system. This investigation was carried out using a prototype conferencing system

with students on several presentations of a short OU course. The focus was on the two main issues of information overload and social presence. The first prototyping study evaluated features aimed at alleviating information overload. The second study evaluated features aimed at enhancing social presence.

Findings from prototyping to alleviate overload

The first prototyping study investigated the following features, which were aimed at alleviating overload:

- branched threading of messages;

- user recommendations of messages;

- user-controlled filtering of messages;

- a 'clippings' facility for a personal record of useful messages.

It was hoped that: branched threading would help students follow discussions more easily; accumulated recommendations would highlight useful messages; filtering would help students to focus just on those messages that required attention; clippings would allow students to keep track of messages that they wanted to revisit.

In order to investigate whether these benefits were realised, a two-stage, quasi-experimental approach was used. During the first part of the course students used a 'basic' version of the prototype system, which did not include recommendations, filtering or clippings, and which had chronological message threading. During the second part of the course students used an 'enhanced' version of the system, which included the new

features and had branched threading. Students were asked about their experiences of each version via closed questions appended to the course assignments and open questions in online surveys.

Most students reported that they had experienced overload in other CMC contexts, although they did not feel particularly overloaded in the current course. The survey results indicated that during the second part of the course, while using the 'enhanced' system, students spent less time in the conferences, and felt less overloaded. This could mean that the new features were helpful in alleviating overload, although the finding could also be explained by students gaining experience and confidence as the course progressed.

The research demonstrated that branched threading was preferred to chronological threading by a large majority of students. This was because it helped them to follow 'conversations' of messages and replies more easily. The recommendation facility was considered helpful in principle by some students, but in practice was little used. This was partly because of problems generating a critical mass and partly because students felt uncomfortable judging the value of others' messages. Filtering on recommendations was not useful with so few recommendations, but the other filtering options were used and considered helpful by some students, particularly the option to filter out messages which the student had already read. The clippings facility received favourable comments, but students would have preferred to keep permanent copies of messages outside the conferencing environment so that they could access them offline and after the course had finished.

Although students' comments about the new features were largely favourable, most students used only the basic conferencing features. The fact that students only met the new features in the enhanced version of the system, after they had become familiar with the basic version, could have exacerbated the problem. For this reason, the second prototyping study did not use a two-stage research approach, but instead included features aimed at enhancing social presence from the start.

Findings from prototyping to enhance social presence

The second prototyping study explored two features aimed at enhancing social presence:

- résumés;

- instant messaging.

These features were included in the prototype conference system from the start of the course. It was hoped that résumés would help students to get to know each other better, and that instant messaging would make online communication feel more spontaneous. Both features could help to overcome the sense of impersonality that some students experience when using asynchronous CMC.

As before, evaluation data was gathered from students via closed questions appended to the course assignments and open questions asked in an online survey towards the end of the course. The open questions were also provided via the course conferences. Students were asked about their use of

résumés and instant messaging, and their views on these features. They were also asked their views on online community within a course context.

About half the students posted some information into their résumé, and about half read others' résumés, typically those of students who had posted messages. About a third of the students felt that résumés helped them to get to know other students, and a similar proportion found photos helpful in résumés. Some students expressed the view that reading messages was a more natural and effective way of learning about others than reading résumés.

The instant messaging facility was not widely used, partly because not many students were logged in at any given time and partly because students felt uncomfortable making contact with others whom they did not know. Also when students tried to contact others they often received no response (possibly because of technical problems) and found this discouraging. Although not many students used the instant messaging facility to actually contact others, students valued the ability to see who else was online when they were. This seemed to provide a sense of solidarity and reassurance.

Students' views on online community varied. Most students felt that it was important to have online contact with other course members, and found it interesting and helpful to read others' ideas and questions. However not all students were convinced that this resulted in a sense of community, and thought it would depend on the individual. Some students said that community was important to them while studying, others said that it was not

important, and some thought that community could only develop face-to-face. Most students thought that synchronous communication could help build community, but many preferred asynchronous communication because it encouraged more thoughtful interactions and was more inclusive.

Summary of findings from prototyping

The two prototyping studies were primarily aimed at addressing the second research question:

To what extent can benefits to learners and teachers be increased, and problems reduced, by changes to the design of a CMC system?

The research has shed light on this question, but more work needs to be done before firm conclusions can be drawn. Evaluating the new CMC features was challenging in the context of a live course, and particularly a short, technical course where students were largely studying individually. Although students felt that the new features were helpful in principle, the features were not very widely used. Because many students had experience of using other CMC systems, particularly FirstClass, they tended to operate in familiar ways, rather than exploring the new features in the prototype system. One clear finding from the research was students' preference for branched threading rather than chronological threading. The value of other facilities, such as recommendations and instant messaging, may depend on the course context in which they are offered to students.

3. Comments on the research approach

3.1 Comments on interviews and observations

The first stage of the research was aimed at eliciting information from students, tutors and teachers about their experiences of CMC systems. A qualitative approach using interviews and observations was chosen in order to encourage participants to give their own perspectives in an open way.

Sampling issues

It proved difficult to recruit participants for the interviews, particularly students. This meant that the approach was largely one of convenience sampling. Moreover, the data came from relatively small samples of students, tutors and teachers, so cannot be assumed to be representative. In the case of the student interviews, the participants were all from a single course. The tutor interviewees were drawn from a range of courses, with many tutors having experience of several courses, but all within the Technology Faculty. The CMC experience of the OU students and tutors was largely limited to use of the FirstClass conferencing system, although several of the interviewees had used other systems. To help address these limitations, interviews were also carried out with teachers at other universities. The interviews were with teachers from four different universities, and included users of the Blackboard, WebCT and Moodle VLEs. These interviews achieved their purpose in broadening the research beyond the context of distance learning at the OU, of technology courses and of the FirstClass system.

Contextual interviewing and observation

The interviews with students were carried out in a number of ways: face-to-face; in a focus group; and by telephone. The telephone and focus group interviews did not permit any observations, but for the three face-to-face interviews observations were carried out. The one observation which took place in the student's home proved to be particularly valuable. This finding is in line with the literature on user-centred design approaches (e.g. Holtzblatt & Jones, 1993) which recommends observation and interviewing in context. For this reason, the interviews with tutors and teachers were carried out in the their homes or offices, and included an observation. The benefits of this change were sufficient to justify the additional travel required.

Data analysis

The interview data was analysed using a 'grounded' approach, so that ideas would emerge from the data. The student interviews were analysed largely using written notes and documents, organising the data in different ways according to different themes. It was also found helpful to create an 'affinity diagram' grouping related ideas and findings together. Although the data was mainly qualitative (students' comments and ideas) it was found helpful to note how many students had raised a given issue.

The data from the interviews with tutors was analysed using the *Atlas-ti* qualitative data analysis software. Notes made during the interviews and observations were loaded into the software and coded for different emergent concepts. The software provided benefits in keeping records of the coding of

extracts from the interviews. This meant it was easy to go back from the concepts being coded to the original data, which helped to ensure 'grounding'. However a disadvantage was that numerous codes and extracts were generated, which could become confusing.

The data from the interviews with teachers was also analysed using *Atlas-ti*. The interview notes were loaded into the software and analysed as before, but the audio transcripts of the interviews were also checked against the interview notes. This helped to clarify aspects of the notes, and check that nothing had been missed. A method was evolved for linking quotations from the interview notes to times on the audio file, so that the actual words of the participants could be referred to. This allowed for an analysis which was grounded more closely in the interviews. Although the process was time-consuming, it provided confidence in the validity of the analysis.

3.2 Comments on prototyping and evaluation

The prototyping investigations took place within an operational OU course. This was beneficial in providing an authentic context for use of the prototype system and exploration of new features. However it placed limitations on how the research could be carried out. Throughout the two prototyping studies it was important that students' learning on the course took priority over the research activities.

The main data gathering technique used in the prototyping studies was to append closed feedback questions to the multiple-choice course assignments. This was supplemented by the use of online surveys with

primarily open questions, in order to gather qualitative data. The feedback questions in the assignments proved very effective in maximising response rates, so the data obtained in this way was representative of students on the course. However, the data gathered via the online surveys was not as representative because only a small proportion of students responded to the surveys.

Overload prototyping study

When planning the research, the course appeared to be a suitable context for the prototyping study on overload. It used whole-cohort conferences with more than 100 students per presentation, so seemed likely to generate a large number of messages. Nevertheless students reported that there were fewer messages than in other courses they had studied, and most students did not feel particularly overloaded. Although this was fortunate for students, it did not provide an ideal context for evaluating features designed to alleviate overload.

The relatively modest number of messages could be explained by the characteristics of the course. As the course was short, students were very focused on their individual work, and did not post many social messages. The course was a highly technical one, so messages tended to be specific queries which could be answered directly. This was in contrast with other courses where there were more general issues to be debated, leading to larger numbers of messages, and longer, more complex threads.

In this prototyping study, comparisons were made between students' use of two versions of the prototype system. In a purely experimental setting the

comparison could have been made by splitting students into two groups, with the groups using different versions of the system. However, in the context of the course this was not possible, so all students used the 'basic' version first and the 'enhanced' version second. It was found that students felt less overloaded during the second part of the course. However, because of the research design it was not possible to tell whether the difference was a result of the enhanced features or (for example) because students became more familiar with the system as the course progressed.

Social presence prototyping study

The course was not an ideal context for the prototyping study on social presence, partly because students were not together for very long, and partly because there were no tutor-groups, tutorials or assessed group activities. Against this background, features such as résumés and instant messaging might not provide many benefits, and this could explain why they were not widely used by students.

In relation to social presence it seemed important to gain qualitative data (students' thoughts and experiences) to supplement the quantitative data from the closed feedback questions attached to the course assignments. Online surveys had resulted in low response rates previously, so to encourage responses the survey questions were additionally provided as message threads in a course conference, with students invited to respond in the conference or by email. Although the response rate was still relatively low, students seemed to prefer responding in the conference.

Differences were found between the overall responses of the two course cohorts which were used for the study. These could not be explained by differences in gender balance or prior experience of study. Discussions with experienced course moderators suggest that such differences in cohorts arise naturally as groups develop their own sense of identity, influenced by members who are particularly active. As Preece (2001, p. 354) points out:

'No two communities are the same, just as no two people are the same.'

This means that it is important to gain feedback from more than one cohort, as in this study, in order to triangulate the findings.

4. Future research

The research has shed light on the problems experienced by users of educational CMC systems, notably the problems of information overload and lack of social presence. It has also evaluated a number of system design features aimed at alleviating these problems. Although the research was carried out largely within the context of distance learning, the issues addressed are increasingly relevant in broader contexts. Many conventional educational institutions are now embracing online communication technologies, typically via a Virtual Learning Environment (VLE). It is therefore important that further consideration is given to the problems which can arise, and to how these problems might be alleviated. The following sections consider possible future investigations which could be of value, both to distance learning institutions and to conventional institutions.

4.1 Further work to investigate overload

One aspect of the overload prototyping study was a comparison of branched threading and chronological threading. This clearly revealed that (within the context of the prototype system and the course) students preferred branched threading. This is a valuable finding, and could usefully be investigated further. It would be helpful to explore in more detail users' mental models of threading. For example, when a user adds a message to a thread, do they always feel that they are responding to a particular message or are they sometimes responding to the discussion as a whole? Further investigation of how messages are threaded and displayed would be of particular value for the discussion forums within VLEs. Different VLEs use different approaches for presenting messages to users, and a single VLE may have various options for controlling how messages are displayed. Research on how these facilities affect learners is therefore important.

The study also explored recommendation of messages. Students reported that they did not want to recommend others' messages because they felt that the value of a message would be different for different people. If, instead of explicitly recommending a message, students were invited to indicate 'I found this message useful', perhaps they would feel more comfortable. With this change, students would be saying something about themselves, rather than about the writer of the message or about an unknown future reader. An alternative approach would be to gather information automatically, for example by recording how many times in total a message was 'clipped' or viewed by students.

Filtering of messages was well-received, although not used very widely. Comments from students suggested that filtering would be more useful in conferences with larger numbers of messages. One student suggested a facility to filter out individual messages. A user could then read a message, decide whether they might need to return to it later, and if not, filter it out. It would be worth exploring this, and other variations on filtering, in a course which was likely to generate large numbers of messages.

Feedback from students on the clippings facility indicated that a version which stored the selected messages permanently and offline would be welcomed. The importance of offline storage may diminish in the future as more students gain broadband access, but it would be worth investigating a clippings facility where students can keep the messages permanently. A student's clipped messages can form a useful personal resource which they may wish to use after the course has finished. From a constructivist learning perspective, the facility is valuable because it encourages students to create their own resource from the conference messages, and organise the messages into categories which they have defined themselves. These processes provide support for students' learning.

4.2 Further work to investigate social presence

Résumés

It was anticipated that having information available via résumés would help students get to know each other. Many CMC systems and VLEs provide facilities for students to create their own user profiles and to upload photographs of themselves. However, in the present study a number of

students did not post information into their résumé. One possible explanation is that students were uncertain about what to write. A structured résumé with separate areas for interests, career, family etc. might help overcome this uncertainty.

One question which arises is whether a résumé can become a representation of a user's identity which they want to convey to others. Many of the tutors and teachers who were interviewed wanted to tailor their computer conferences or VLE areas in order to build a visual identity for their tutor-group or course. This idea could be extended to enable students to build a visual identity for themselves. In social networking environments such as MySpace (www.myspace.com) or Facebook (www.facebook.com) users create profiles to convey their personalities and interests to others, and in virtual environments such as Second Life (www.secondlife.com) users can tailor avatars to represent themselves. If users of educational CMC systems or VLEs were provided with tools to create a strong visual presence for themselves, this might enhance social presence.

Instant messaging

One reason for the relatively low use of instant messaging was that students were uncomfortable contacting people they did not already know. It seems likely that instant messaging would be used more if students have already met (either face-to face or online) in tutor groups or project groups. It would therefore be worth evaluating instant messaging further in a course which used smaller groupings of students, which included collaborative tasks, or where students had already met face-to-face. One possibility would be to

evaluate an instant messaging system within a VLE used in a conventional university.

When planning the research, it was decided to implement and evaluate a one-to-one instant messaging facility, rather than a multi-user chat room. However, it would be of interest to investigate the use of a multi-user chat room, and compare it with instant messaging. Students might be more willing to go into a chat room, rather than inviting someone to an instant message conversation. The implication of a chat room is that others have chosen to be there, whereas an instant message invitation might be considered an interruption to the other person. A chat room could also be used for scheduled course discussions, with or without a tutor.

Another consideration when planning the research was whether a buddies facility should be provided. It was decided that this was unnecessary, partly because the course used for the investigation did not have any smaller groupings of students. However, it would be valuable to investigate a buddies facility in a course which used tutor groups or project groups. Buddy lists corresponding to the groups could be automatically set up, so that students were notified when a member of their group logged in.

5. Contribution of the research to the field of educational CMC

The research reported here has investigated possible improvements to the design of an educational CMC system. The first stage of the research clearly established that students experience problems when using current CMC systems as part of their courses. One major issue is in navigating through the

large volume of messages in an active discussion environment. This can be a time-consuming and confusing process. A second issue is that asynchronous CMC can feel impersonal, leading to difficulties in effective communication. Interviews with users revealed that these two issues – characterised as information overload and lack of social presence – are serious problems for learners. The second stage of the research therefore investigated CMC system features specifically aimed at addressing these issues.

The investigation of features to address overload demonstrated that branched threading is more helpful to students than chronological threading. This is because it allows students to follow the different conversational strands which arise in an active discussion. The investigation also explored user recommendation of messages, and found that this feature was little used. It seems that students are not comfortable judging whether a message might be useful to others. The investigation of filtering facilities revealed that the most useful filter was to hide messages that the student had already read. This feature was valued by students even though unread messages were already distinguished visually from those that had not yet been read. A personal 'message clipping' facility was also found useful, but would be more so if the clipped messages could be stored permanently and offline. Students need easy access to a personal record of useful messages, both during and after the course.

The investigation of features to enhance social presence shed light on social and temporal aspects of CMC systems, by exploring the use of résumés and

instant messaging. Résumés were investigated as a way of helping students to get to know each other, and to feel a more personal connection with others. The investigation showed that résumés were helpful to some students for this purpose, but that some students preferred to learn about others through their messages, feeling that this was more natural. Instant messaging was investigated to see whether it would help students feel more connected to each other by communicating in real-time. Some students did feel more connected, but this was through an awareness of others who were online, rather than by actually contacting them. Because students did not already know each other, they felt uncomfortable initiating contact.

In conclusion, this research has identified problems users experience when using CMC systems in an educational context, and has evaluated features aimed at addressing these problems. The research has shown the importance of good threading facilities for discussion forums, so that students can navigate more easily through the volumes of messages. It has also shown the importance of social aspects of CMC. Students need to feel comfortable with each other in an online environment, and there are few short cuts to this process. Features such as résumés and instant messaging can help, but synchronous communication will not be used 'cold' by most students. Students value the more reflective nature of asynchronous communication, and appreciate the opportunity to read and write messages in their own time. We can conclude that future CMC systems need to combine asynchronous and synchronous communication in a design which exhibits good usability and attention to the social aspects of online communication.

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Appendix 3A
Interview schedule for student interviews

Questions about CMC systems

Interviewee(s):

Date/time of interview:

Location:

1. Your CMC use

1.1 Roughly how much time per week do you spend using FirstClass?

1.3 How much time per week do you spend in the national course conferences?

1.4 Do you write many messages or do you tend to just read?

1.5 Roughly how much time did you spend in total using your small-group conference during Module 4?

2. Your views on CMC systems

2.1 When you first started using FirstClass did you find it easy or difficult to learn?

  In what respects?

2.2 Do you now find FirstClass easy or difficult to use?

  In what respects?

2.3 What do you like about FirstClass?

  What features are particularly helpful?

2.4 What do you dislike?

  What features are annoying or unhelpful?

2.5 Have you used other computer-based communication systems? If so, which?

2.6 What did you like about them?

2.7 What did you dislike?

2.5 If you could speak to the designers of FirstClass, what improvements would you suggest?

3. Problems and benefits

3.1 In your experience what are the problems with using CMC?

3.2 Could any of these be overcome by changes to CMC systems?

4. Different uses for CMC

4.2 Are there CMC features which would be particularly helpful when using the national course conferences?

4.4 Are there features which would be helpful for the group work in Module 4?

Appendix 3B
Overview of findings from student interviews

Note: the figures in brackets are the number of students to whom the data, opinion, or suggestion relates.

Usage

Time per week overall: Half an hour (1); 1-2 hours (4); 3-4 hours (2); 5-6 hours (3).

Time per week in national conference: between none (2) and 4.5 hours (1)

Time per week in project conference during module 4: between 1 hour (2) and 7 hours (1)

Other CMC systems used: Hotmail (4); MSN (4); Lotus Notes (2); Outlook/Outlook Express (7); Yahoo (2); Web bulletin board (1); Newsgroups (1); ICQ (1); IRC (1).

Dislikes / Problems

Issue is time and too many messages in national conference (6). Conferences should be archived frequently. (1)

Can't tell from header whether to read a message - conversation drift (2). Too much junk / need to be able to sort wheat from chaff (5). Usefulness of threading depends on how well others use it (1)

Rarely/never write - someone's usually already said it (5).

People can misconstrue (1) or dominate (1). Problems with abuse/tone (2).

Time lag between people logging on is frustrating (2). Can't contact people if they don't log on (2).

Don't like being kicked off (3), having news messages popup (2) and having mail messages expire (2). 'Who's online' updating and losing the sorting (all issues of control).

User interface could be more supportive to novices (1). Initial setup is hard (2).

Web interface is slow (2) and not at all user friendly (3) - various problems paging through message lists and reading and posting messages in different conferences (7).

Don't like each message appearing in a new window - though this has advantages (1).

Sometimes can't tell if system is doing anything or whether it has done what you wanted (1).

If you change your mind about sending a messages you can't just delete it (1).

Small fonts (1). Pale icons (1).

Mail messages can easily go to wrong person or wrong server (3).

Difficult to find things / too many conferences (3).

Only use small proportion of functionality (2). Never mastered the offline reader (1).

It's non-personal, text based (2).

Some terminology in interface is too techie (1).

You need access to a computer (1). It can be expensive (1).

In Outlook addressing is difficult (you need to know a lot of information about the person's name (1).

In Hotmail there is too much spam (1).

Likes / Helpful features

Using FirstClass is easy (6).

Icons (with rollovers) are good (4).

The desktop idea (1).

Sub-conferences and folders (3).

Flexibility to change things is good - but needs to be easy to do (3).

Useful tips & ideas in national conferences - worth reading through (2).

Sorting is useful, especially by thread (2).

Searching is useful - but do many people remember to use it? (2)

Highlight and reply for quoting is handy (1).

'History' feature is very useful (4).

Résumés are very useful - give you an idea of what the person's like and their background (3).

'Who's online' facility is used (3).

Synchronous chat useful - e.g. can thrash out disagreements (3).

Calendar is used (3).

In Lotus Notes, database aspects (1), easy toggling between conferences (1), soft colours (1).

In Outlook, rules and filters (1).

Needs/Desires

Could it be personalised to you (e.g. by course)? Filter out some things. A portal? (2)

Improve structure (use a tree?) and methods (pointers?) for finding useful things (3).

Document management is difficult using attachments - need a shared file-space and versioning (1).

Option to store mail messages locally (2).

List of people in a conference (e.g. for a tutor group) (1)

Information about people (e.g. which course? are they a tutor?) (2).

Icon to indicate if someone has a résumé/compulsory résumé/prompt to complete one when first log on (3).

Easy way to save a Chat transcript (1).

Audio conferencing (2) , webcam (2), voice-to-text conversion for Chat (1).

Who's online (image/webcam in corner?) and private chat for a defined group (6).

In web interface, ability to have several conferences open at once and have buttons to switch quickly between them (1).

Incorporate a web searching tool (1).

Version for PDA (1).

Easier addressing for mail messages (clickable address book) (1).

Shading across message lists for ease of reading (1).

Appendix 3C
Spreadsheet summary of student interviews and observations

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
Hrs/wk: overall	4, 2, 0.5, 1, 1	1.5	5 to 6	over 3.5	5	5
Hrs/wk: national	Quite a lot. Very little. None. Now & then.	1.5	2.5 to 3	2.5 to 3	0	4.5
Hrs/wk: project group	Quite a bit. Not much. 1, 7, 4 to 5.	1	?	1.5	2 to 2.5	5 to 6
Reading and writing messages	In national conferences mostly read - time issue - & someone else has usually answered already	Answer if can help.	Never write in national conferences. Do in tutor group.	Regularly in tutor group. Rarely in national.	Reads more than sends.	In national mainly read. Active in tutorial/project.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
Other systems used	Hotmail. Yahoo groups (chat, forums). ICQ (conferencing). MSN Messenger. IRC (mainly synchronous). XML mail system called Jabber.	Lotus. Outlook. Hotmail. Yahoo. T209 group on MSN (until T209 early-bird conference available).	Hotmail. Outlook. Tiscali (ISP).	Netmeetings (video conferencing). Outlook - exchange server. Outlook express - into BT internet.	Lotus Notes. Outlook express. Exchange. MS Messenger. MSN. Newsgroups.	Hotmail. Outlook. Bulletin-board (web-based) for user group.
Likes and dislikes about other systems	Jabber is quick and easy. IRC is good. ICQ is annoying.	Database aspects of Lotus (document store) are good. Don't like addressing in Outlook - need to know more about a person's name.	Tiscali easy to use. Web page info good. Don't get junkmail. Hotmail v. good. But loads of spam.	Rules and filters in Outlook e.g. filter out junk; out-of-office message; automatic forwarding.	In Lotus can have several conferences open at once and toggle between. MSN - full of kids. Newsgroups - useful because audience targeted. Lotus pleasant on the eye - soft colours - also horizontal shading in message lists.	Can delete messages in Outlook.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
General comments	Offline reader not so visually pleasing as client. In groupwork, time spent depends on the group. Writing messages takes time - for groupwork more in buildup to TMA. Effectiveness of threading depends on people using it properly. Groupwork only as good as the weakest member - who may have problems beyond their control. The problems are generic to groupware. Can be a distraction from other aspects of your studies (but there's the same issue at work, so it's good practice too?).	People dominating. Value support and help from other students. The facilities were there for group work (e.g. live chat) but we didn't use them. Haven't used personal email - no relationships with other students built up.	Delay in responding – frustrating. People can misconstrue. Use CMC too much! Non-course use too. Use Chat in tutorial group.	People out of contact. Time lags. In group, useful to post messages synchronously. Prefer threads expanded. Has broadband. FirstClass mail set to forward to BT account - always on, so get messages straight away.	No way to contact people if they don't log on. Uses web interface because had technical problems with client.	Would be nice to see what other project groups produced - put it online. Technical problems waste time. Uses web interface at work. Doesn't use Chat [social] conferences (except one year after summer school). Doesn't use Back button on web because of security advice from work.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
National conferences	Poor signal to noise. Useful tips - worth reading through to find them. Early bird conference great. Too many messages to keep up with - takes too much time. Problems with abuse/chat. Can't choose what to read without reading whole message. Used by hard core. Moderating in some conferences is awful e.g. OUSA. Volume of information - too many conferences & too much in them.	Finding the time is a problem. Sorting wheat from chaff.	Large volume. Only read first few replies in a thread. Never write -others ahead Put off by tone of some messages - it's awful. Junk/repetition. Judge messages by number of replies. Sometimes respond by email.	Read headline to judge whether to read message - but can't always tell - conversation drift. Rarely post - someone's always said it already. Large conferences get too large - moderators don't always archive enough.		Can waste time. Lots of useless postings. The issue of junk is down to the students (and it's moderated). ECA [end-of-course assessment] conference useful for getting ideas.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
Ease of learning and ease of use	Initial configuring hard, e.g. knowing which group Instructions helpful - but not everyone reads them. Probably only use 10% of functionality. Navigation is difficult - difficult to find things. Easy to learn & use. Web interface difficult – but useful to have.	Navigation/finding things was hard initially. Web interface difficult. Emailing & that side of things straightforward. Client is ingrained, so straightforward. Only use main features - reading and posting.	Web interface very hard - frustrating. Wouldn't contribute if had to use this. Icon overload/ too many conferences. Very easy. Like icons. Not scared to explore.	Interface needs to be better for novices. Easy to learn & use. Not frightened. Use help files & instructions. Like icons - they have got better in different versions.	Isn't obvious how to sort messages (web interface). Easy & obvious to learn. Didn't need to look at help. Easy to use but sometimes doesn't do what you want (web interface).	Never mastered offline reader. Likes icons - with rollover descriptors. Some terminology not understandable - too techie. Easy and straightforward to learn. Very easy to use. There's a helpdesk, but need access in the evening. When searching directory can't tell if it's doing anything. Similarly for who's online. Couldn't work out what the Address Book was - and why things were greyed out.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
Useful features	Sorting. Threads - easy to catch up. History- tell if message read. Cross-platform - Mac & PC. One window per message handy for flipping. Can change your font. Calendar. Searching. Reliability & up-time good.	Find - but forget to use it. Sub-conferences help divide things up (but then more places to look).	Ability to change things. Folders. Calendar. History. Résumés - disappointed if someone hasn't got one. Ability to change things. Forward from national to tutor conference. Chat - good for morale, and can thrash out disagreements. Who's online.	Sort by thread. Who's online - "we knew we were there". Forward mail to another system. Highlight and reply. Offline reader - no need now – broadband. Résumés - give you an idea of what people are like, and their background. History. Customised desktop - put conferences straight on desktop. Used to use offline reader, but don't now.	Who's online. Chat - but can't type fast enough. Basic desktop concept - groups on desktop. Colours.	Subconferences, with helpful labelling. Calendar. 'Next in thread' facility - for national conferences. In tutor group reads everything anyway. Résumé. History - mainly in tutor group & project group. Iconised - makes it easier, especially for sending messages.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
Dislikes and problems	If change title disrupts thread. Popup system messages. Opens new window for each message. Expiring mail messages. 'Who's online' updates & loses sorting. Fonts too small - look & feel could be improved. Non-personal - text based. All the different electronic sources (FirstClass, web, CD makes it bitty - needs integrating. Too much info in FirstClass e.g. each Faculty has their own. Expensive on dialup. Difficulties getting in - and then being kicked off.	Offline reader. Not a personal relationship. Being kicked off after 15 minutes inactivity. Pale icons in v7 - can't distinguish them.	Problem with Chat if people on different servers.	Chat - need to type fast. Getting kicked off by FC. Mail can go to wrong server or wrong student.	Flicking between conferences awkward in web interface - can't stack them as windows. Slow to access things e.g. opening a conference. Mail messages expiring. In web interface get bounced back to mailbox after sending a conference message. Lose task bar if scroll down (web interface again). When server goes down & you get an error message. Need access to a computer!	Not sure if message sent. No option to delete messages you don't want to send. Web interface message list - returns you to the first page. System messages springing open. Directory / address book has multiple entries. Résumé on other server - not readable. Web interface paging - can only go one page forward and back. Web interface slow. Need lots of passwords - difficult to remember.

Topic	Focus group (Students 1-5)	Student 6	Student 7	Student 8	Student 9	Student 10
New features needed	Group document management. Store mail messages locally. Want choices - e.g. whether new message comes up in new or existing window. Instant chat within a tutor group. Be told whose online from your group. Image/webcam in corner of those logged on. Webcam/voice interaction. Tree structure & drill down for finding things. Personalised portal - filter out some things. Configure by user ID. Need pointers to find useful things - they are buried. e.g course choice - could be linked in to the course? Easily tailor/personalise it to suit your preferences. Better navigation to find useful conferences.	Buddies - alerted when mates online. (Almost) compulsory résumé.	Private chat & who's online just for group. Buddies. Prompt to fill in résumé when first log on. Easy way to save Chat transcript. List of tutor group members.	Be able to get info about people e.g. course being studied - to identify them. Who's online in group.	Favourite conferences on a toolbar. Several conferences open at once (web interface). Shading of message lists to ease reading across screen. Turn a page rather than scrolling down a list. Sort into categories (web interface). Incorporate web search. Version for PDA. Store mail messages locally. Email addresses available - group address book. Click on person and it opens mail to them. Voice interaction or voice-to-text for Chat. Webcam. Tailor interface to the user – personalise.	In web interface, go to a particular page in the list. 'Find' facility on web interface Be able to find out who's a tutor and who's a student. An icon to indicate whether someone has got a résumé. Option to delete message when change mind about sending it.

Appendix 3D
Extracts from affinity diagram for main topics

Overload

Issues	Useful features	Desired features
Too many messages - takes too much time	Threading - but only if people use it properly	Easier search facilities
Can't sort the wheat from the chaff	Threads - useful for catching up	Better navigation among conferences
Can't tell content of message from title - topic drift	'Next in thread' facility	Pointers to useful conferences
Don't contribute because someone has always said it already	Sorting by thread	Tree structure for conferences - with drill-down
Too many conferences	Search facilities	
Navigating around conferences and finding things is difficult	Sub-conferences and folders - with good labelling	
	Forwarding messages to another conference	

Social Aspects

Issues	Useful features	Desired features
Not a personal relationship	Resumes - disappointed if someone doesn't have one	Find out information about people e.g. what course they are on
Non-personal because text-based	Resumes - Gives you an idea of what the person is like	Find out who's a tutor and who's a student
Messages can be misconstrued	History - to see who's read your message	Have compulsory resumes
Unpleasant tone of some messages		Prompt to create a resume when first log on
Some members dominate		Have an icon to tell you if someone has a resume
		See a list of group members

Synchronous Features

Issues	Useful features	Desired features
Other people are out of contact	Useful to post messages synchronously	Notification when 'buddies' - or group members - come on line
Lag between message and reply is frustrating	The 'Who's online?' facility - we held a meeting because we knew we were there	'Who's online' for a group
Chat tool - can't type fast enough	Chat tool - good for morale & can thrash out disagreements	Private Chat within a group
		Transcript for Chat
		Voice interface for Chat
		Webcam
		Video-conferencing

Usability

Issues	Useful features	Desired features
Probably only use 10% of the features	Desktop concept - grouping	Improvements to web interface
Only use the main features	Customisable desktop	Personalised portal
Problems with mail addressing with multiple servers	Ability to change things	Tailor it to suit you
Web interface not user-friendly	Iconised	Choices
Web interface slow	Icons with rollovers	
Interface uses technical terms	Pleasant colours	
Offline reader hard to use	Easy to use	
Searching is not obvious	Easy to learn	
Interface not good for novice		

Appendix 3E
Interview schedule for tutor interviews

Interviewee(s):

Date, time & location of interview:

1. Your CMC use

1.1 Roughly how much time per week do you spend using FirstClass?

1.2 How much of this time is work in your tutor-group conference?

1.3 Do you spend any time in any other conferences?

2. Your views on CMC systems

2.1 When you first started using FirstClass did you find it easy or difficult to learn?

2.2 Do you now find FirstClass easy or difficult to use?

2.3 What do you like about FirstClass? What features are particularly helpful?

2.4 What do you dislike? What features are annoying or unhelpful?

2.5 Have you used other computer-based communication systems? If so, what did you like or dislike about them?

2.5 If you could speak to the designers of FirstClass, what improvements would you suggest?

3. Problems

3.1 In your experience what are the problems for students when using CMC?

3.2 What are the problems for tutors?

3.2 Could any of these be overcome by changes to CMC systems?

4. Different uses for CMC

4.2 Are there CMC features which would be helpful for students or tutors when working with large conferences?

4.4 Are there features which would be helpful when working with a tutor-group conference?

4.4 What features which would be helpful for carrying out, or supporting, small-group work ?

4.5 What features would help you in your tutoring role?

5. Pegagogical aspects

5.1 To what extent do you think CMC has educational value?

5.2 What kind of CMC system would be ideal from an educational point of view?

Appendix 3F
Codes from *Atlas-ti* analysis of tutor interviews

The table lists the codes resulting from the *Atlas-ti* qualitative analysis of the interviews with tutors. For each code, the number of quotations is given for each of the interviewees.

For example, the first row shows that for the code 'Archiving', there was one quotation (extract) coded in the interviews for each of Tutor 1, Tutor 2 and Tutor 4 , and two coded in the interview for Tutor 7, giving a total of 5 quotations for that code.

Codes	Tutors									Totals
	1	2	3	4	5	6	7	8	9 & 10	
Archiving	1	1	0	1	0	0	2	0	0	*5*
Broadband	0	0	0	1	1	0	1	2	0	*5*
Calendar	1	1	0	1	0	0	1	0	0	*4*
Chat	1	4	2	6	0	3	2	2	1	*21*
Chat transcript	0	0	0	2	0	1	0	0	0	*3*
Check activity	5	4	1	1	1	0	2	0	1	*15*
Colour/font	0	2	0	3	1	0	0	0	0	*6*
Conferences & sub-conferences	2	6	0	5	1	3	5	0	1	*23*
Create conferences	0	0	0	4	1	2	2	0	0	*9*
Desktop, icons, images	0	0	0	6	3	3	2	0	0	*14*
Dislikes	3	2	3	10	4	2	4	0	1	*29*
Easy to learn?	1	1	1	1	3	1	1	1	1	*11*
Easy to use?	1	1	1	1	1	1	1	1	1	*9*
Educational value	4	1	2	5	3	3	2	0	0	*20*
Email addresses	0	0	0	1	0	1	1	0	0	*3*
Expectations	0	0	0	0	2	0	2	0	0	*4*
Face to face	1	2	0	0	1	0	0	3	1	*8*
Filing and folders	0	4	0	0	1	0	2	1	1	*9*

Codes	Tutors									Totals
	1	2	3	4	5	6	7	8	9 & 10	
Getting started	0	4	2	4	0	0	1	0	0	*11*
History	1	1	1	1	1	1	0	1	1	*8*
Ideal educational system	0	1	1	1	0	2	2	0	0	*7*
Improvements	3	3	1	8	4	1	5	0	5	*30*
Information and communication	1	4	3	1	3	4	2	2	0	*20*
Large conferences	2	1	1	2	2	0	4	3	1	*16*
Likes	1	3	1	11	3	2	4	5	4	*34*
Links in messages	0	1	0	2	1	0	0	0	0	*4*
Links to other systems	2	3	1	0	0	0	1	0	5	*12*
Lyceum [audio-conferencing]	5	0	2	1	1	2	0	1	0	*12*
Management – desires	2	1	0	4	2	6	4	0	0	*19*
Management – useful	3	11	1	9	5	4	7	2	2	*44*
Many conferences	0	0	0	4	0	1	1	0	0	*6*
Many messages	3	3	0	3	1	1	3	0	0	*14*
Message title	3	1	0	0	0	0	0	0	0	*4*
Moving messages	0	1	0	1	0	3	0	0	0	*5*
Offline reader	1	3	1	1	1	1	1	1	0	*10*
Online [synchronous] tutorials	0	2	0	2	0	0	0	0	0	*4*
Other systems	2	2	1	1	2	0	1	0	0	*9*
Overload – desires	7	0	1	3	4	0	3	0	0	*18*
Overload – problems	9	3	1	9	5	4	6	1	0	*38*
Overload – useful	1	3	0	3	5	1	9	1	1	*24*

Codes	Tutors									Totals
	1	2	3	4	5	6	7	8	9 & 10	
Participation	1	0	3	2	3	3	1	1	2	16
Presence – desires	0	0	0	1	0	0	1	0	0	2
Presence – problems	2	1	0	0	3	2	2	0	1	11
Presence – useful	0	3	0	3	2	0	0	0	0	8
Preview	2	0	0	0	0	0	1	0	0	3
Problems for students	4	2	3	3	3	2	4	0	1	22
Problems for tutors	1	3	0	5	1	1	2	1	2	16
Red flags [unread messages]	1	0	0	0	0	0	0	1	1	3
Relationships	2	2	0	2	2	0	1	0	5	14
Résumés	0	1	0	0	1	0	1	0	1	4
Search	0	0	0	1	0	0	1	0	1	3
Shared moderating	0	1	0	3	0	0	2	0	0	6
Shared workspaces	0	0	0	3	0	0	0	0	0	3
Small-group work	1	0	1	1	0	0	2	0	0	5
Sorting	1	0	1	0	0	0	1	0	0	3
Students daunted	3	1	0	0	1	0	1	0	1	7
Synchronous – desires	2	4	3	1	1	2	0	3	1	17
Synchronous – problems	2	0	0	0	0	0	0	0	0	2
Synchronous – useful	1	2	1	0	0	3	0	0	0	7
System changes	2	0	1	2	0	1	0	0	0	6

Codes	Tutors									Totals
	1	2	3	4	5	6	7	8	9 & 10	
Threading	5	0	1	2	6	2	1	1	1	19
Time	1	0	0	0	1	1	1	1	0	5
Time in other conferences	1	1	1	1	3	1	1	0	0	9
Time in tutor group	1	1	1	1	1	1	1	0	0	7
Time lags	0	0	0	0	0	0	0	2	0	2
Time per week	1	1	1	1	1	1	1	0	0	7
Tone of messages	1	0	0	0	2	2	2	0	0	7
Tutor group conferences	1	1	1	1	0	0	4	2	0	10
Tutoring role	1	1	0	4	0	0	1	0	0	7
Unknown features	0	0	2	1	0	0	1	0	0	4
Usability	5	5	6	6	0	2	3	5	4	36
Video-conferencing	0	2	0	1	1	0	1	0	0	5
Web interface	0	0	2	1	2	0	1	0	0	6
Whiteboard	0	2	0	1	0	0	1	0	0	4
Who's online	0	1	0	3	0	0	0	0	0	4
Workload	1	1	0	0	2	0	1	1	0	6

Appendix 3G
Interview schedule for university teachers

[Note: In this interview schedule, 'CMC' was used as a shorthand for the communication facilities in a VLE or other computer-mediated communication system. This was explained to each interviewee before the interview commenced.]

Interviewee :

Date, time & location of interview:

1. Your CMC use

1.1 Which CMC system(s) do you use in your teaching or support work?

1.2 Roughly how much time per week do you spend using the system(s)?

1.3 What kinds of things do you and your students do using CMC?

2. Your views on CMC systems

2.1 When you first started using educational CMC systems, did you find this easy or difficult?

2.3 What do you like about the system(s) you use? What features are particularly helpful?

2.4 What do you dislike? What features are annoying or unhelpful?

2.5 If you could speak to the system designers, what improvements might you suggest?

3. Problems

3.1 In your experience what are the problems for students when using CMC?

3.2 What are the problems for teachers?

3.2 Could any of the problems be overcome by changes to CMC systems?

4. Different uses for CMC

4.2 Are there CMC features which would be helpful for students or teachers when working in large forums?

4.4 Are there features which would be helpful for small-group work ?

4.5 Are there features which would help you in your teaching or support role?

5. Pedagogical aspects

5.1 To what extent do you think CMC has educational value?

5.2 What kind of CMC system would be ideal from an educational point of view?

6. Conclusion

6.1 Are there other comments you would like to make about educational CMC systems?

Appendix 3H
Brief overviews of interviews with university teachers

Eleanor works at University A. The courses she teaches are concerned with local government and community work, and they have campus-based students as well as distance learners who are working in these fields. Eleanor's main concerns are to do with community and learning. Her aim is to link the work-based distance learners with the full-time campus students, so that they can work collaboratively and learn from each other. Eleanor's approach to the system aspects is to "take the tool as it comes and work with it", and she values the help of the local support team. However she finds that students have problems dealing with the large volume of messages and threads in discussion forums. Eleanor feels that a VLE supports deeper learning, but complexities in the system can act against this. She would like to use synchronous tools such as chat and whiteboards but has not succeeded with these so far.

Michael also works at University A. His main role is in the management and support of the university's VLE, but he also teaches on staff development courses which use the VLE for group work and action learning. Michael would like to see more integration of communication tools and resources, and would also like more scope for visual aspects such as colours and fonts. He feels that the hardest thing for students is adapting to the culture of text-based communication e.g. issues of permanency, volume and how discussions are organised. Michael thinks the element of reflection is important, so he prefers forums to chat rooms. However he would like to see more use of electronic whiteboards for brainstorming.

John works at University B. The context he discussed was his use of the university's VLE to support students learning to be art and design teachers. John focused on issues of community and communication for these students, particularly when they were away from the university on teaching practice. The system keeps students in touch with him, with each other and with the university while they are undergoing a difficult role change. This is important to the students, who often feel very isolated. As well as students talking to each other about the issues they are facing, John informs them about university events, job opportunities etc. However, John finds that problems with the system act against these benefits. For instance, students find the threading confusing and there are difficulties with non-text media. John tried a chat room, but thinks that students prefer to reflect on their contributions and edit them before 'going public'.

Judith also works at University B. She uses the VLE for group project work with MA Visual Arts students. The system allows for time-flexible discussion among students and preparation for face-to-face sessions, so that these can be more like workshops. Judith also finds it useful for providing resources, news and event information. She would like to see the VLE being

used by students and staff to build a rich learning environment outside formal courses. Her aim is for students to explore ideas and resources, and initiate activities for themselves. The technical limitations of the system, particularly visually, are a frustration to her. She has made great efforts to make the online spaces look more interesting and inviting, even though this took a lot of time. She thinks that flexibility is an important factor, so that teachers can do things in different ways.

Mark works at University C where he teaches courses in Health. The course he discussed has several hundred students and is taught entirely online. Students work in small groups, posting up their work and carrying out peer reviews. Mark's main focus was on educational issues, particularly using communication technology to support a constructivist, enquiry-based approach. He has used several different systems over a number of years. It is important to him to have the flexibility to fit the system to the educational design. Many of his students are not confident with ICT and they often live at a distance from the university, so any technical problems are an issue for them. Mark only uses small groups in his teaching because of the 'anarchy' which can arise in large online groupings. He finds that, regardless of the system used, students put things in the wrong place. He thinks it is important to see forums, threads and messages together, in order to gain an overview of the discussion. He would like to use synchronous tools for virtual meetings, but finds the chat tool in the university's VLE not very usable.

Henry teaches History at University D, which has developed its own VLE. He uses the VLE in a quite specific way, as a place for students to post work and to give comments on the work of other students. These activities are assessed to encourage students to take part. The longer discussions then take place in face-to-face sessions, not online. Henry does not like discussions in forums because he feels they are incoherent and the threading confuses students. Henry concentrated on the learning benefits of shared preparation, via the VLE, for face-to-face work. He finds that this significantly improves large classes, and enables him to see where students need help. He marks students' work and gives feedback online. The course VLE forums gradually build into a resource which is useful for revision. Henry also commented on usability issues and how these could put off both students and staff members. Henry's use of the VLE started with synchronous chat, but he felt this was not effective as it depended too much on his presence and interventions.

Appendix 3I
Codes from Atlas-ti analysis of teacher interviews

The table lists the codes resulting from the *Atlas-ti* qualitative analysis of the interviews with university teachers. For each code, the number of quotations is given for each of the interviewees.

For example, the first row shows that for the code 'Accessibility', there was one quotation (extract) coded in Eleanor's interview, two in Michael's, and one in each of John's, Judith's and Mark's, giving a total of 6 quotations for that code.

Note that a given quotation can be assigned to several different codes.

Key:

E = Eleanor; M = Michael; Jo = John; Ju = Judith; M = Mark; H = Henry.

Codes	E	M	Jo	Ju	M	H	*Totals*
Accessibility	1	2	1	1	1	0	*6*
Active learning	1	1	0	3	1	0	*6*
Adjusting to the system	1	0	0	0	1	2	*4*
Anxiety	2	1	2	4	2	0	*11*
Archive	0	1	0	4	2	0	*7*
Assessment	3	1	1	4	6	10	*25*
Calendar	0	2	3	0	0	0	*5*
Collaborative workspaces	0	5	1	1	0	0	*7*
Community	2	2	3	1	0	0	*8*
Discussion	0	1	1	4	0	3	*9*
Distance learning	7	0	2	1	1	2	*13*
Educational value	1	3	0	3	1	3	*11*
Email	0	5	1	2	1	1	*10*
F2F	2	3	0	2	3	12	*22*
Flexibility	2	1	6	5	6	4	*24*
Forums	5	7	5	0	14	4	*35*
Graphics	1	0	7	2	0	0	*10*
Groups	7	4	1	2	2	4	*20*

Codes	E	M	Jo	Ju	M	H	*Totals*
Integration	0	7	0	1	0	0	*8*
Learning	2	2	0	3	3	5	*15*
Learning model	1	3	0	0	5	0	*9*
Links to University systems	1	0	1	2	1	2	*7*
Local support	3	0	2	0	2	2	*9*
Navigation	2	0	0	0	3	2	*7*
Other systems used	1	2	1	0	7	0	*11*
Overload	8	2	1	1	1	0	*13*
Participation	4	2	1	0	0	7	*14*
Permissions	3	9	0	0	0	3	*15*
Pictures of people	0	1	1	1	1	0	*4*
Reflection	0	3	1	1	3	1	*9*
Resource	1	0	1	6	0	5	*13*
Staff attitudes	5	2	1	1	3	8	*20*
Structure	1	7	3	2	1	1	*15*
Student activities	2	6	1	2	2	12	*25*
Students' attitudes	11	4	5	1	7	5	*33*
Synchronous	3	4	1	0	3	3	*14*
System used	1	1	1	1	3	1	*8*
Teacher's experience as learner	1	1	0	0	0	1	*3*
Teacher activities	3	9	3	6	5	6	*32*
Technical problems	6	2	4	4	6	2	*24*
Threading	15	4	1	0	10	3	*33*
Time	7	2	1	6	1	12	*29*
Usability	5	4	10	5	6	14	*44*
Visual appearance	0	7	0	5	1	0	*13*

Appendix 4A
Surveys from the May 2004 presentation

The tables show numbers and percentages of respondents for each response option.

First online survey

A. Prior Experience

A1. Please indicate your prior experience of using email (select all that apply)

I have not used email prior to this course	0	0%
I have used email in connection with my studies	4	29%
I have used email to communicate with friends and/or family	4	29%
I have used email in my job	5	36%
I have used email extensively for all or most of these activities.	11	79%

A2. Please indicate your prior experience of the Open University's FirstClass computer conferencing system

I have not used FirstClass prior to this course	0	0%
I have some experience of FirstClass	4	29%
I have considerable experience of FirstClass	10	71%

A3. Please indicate your prior experience of other group communication systems (select all that apply)

I have no prior experience of other group communication systems	2	14%
I have used a ListServer (or other mailing list facility) for group communications	4	29%
I have used web-based discussion boards	11	79%
I have used newsgroups	6	43%
I have used other group communication systems (please specify in Question A4 below)	2	14%

A4. Please add any further comments about your prior experience of group communication systems

"Netmeeting and Outlook - full implementation at work for email, arranging meetings, checking peoples availability etc."
"I enjoy using First Class because I'm very familiar with it."
"Lotus Notes (if that counts - it does have limited conferencing abilities)"
"and newsgroups (only seem to be able to select two options from a3. *Also a simple browser/form based forum for a different course/school.* *Run simple 'broadcasting' systems under DOS and DEC networks. (A long time ago.)* *Yahoo groups"*

B. Time Spent Conferencing

B1. On average, how much time per week have you spent using the TT380 conferencing system during weeks 3-6 of the course?

Less than 30 minutes	1	7%
30 minutes to 1 hour	5	36%
Between 1 and 2 hours	5	36%
More than 2 hours	3	21%

B2. How do you feelings about the time you needed to spend?

It was not a problem	13	93%
It was just acceptable	0	0%
It was too much	1	7%
It was far too much	0	0%

B3. Please add any further comments about the time you have spent using the conferencing system

"I've been unable to access the conferencing system as much as I'd like due to personal circumstances."
"The advantage of a web-based system is that you can log in from anywhere - I am able to check the forums from work, which is great cos you can think about some posts and then answer later at home."
"There is much less chit-chat on this course (appearing on this conference). Whether thats because there are less students or because the conference lends itself less to it is debatable."
"Conferencing on previous Web Apps courses has been difficult due to the overwhelming volume of messages, but has been much more manageable on this course."

C. Reading Messages

C1. What proportion of the conference messages did you read?

Less than 25%	0	0%
Between 25% and 50%	3	21%
Between 50% and 75%	0	0%
More than 75%	5	36%
I read all the messages	6	43%

C2. How did you judge which messages to read?
(Select all that apply)

From the thread or message title	8	57%
From the number of messages in the thread	2	14%
From the message author	2	14%
By glancing at the message content	5	36%
I only read messages in selected conferences	1	7%
I only read the Announcements only	0	0%
I read all the messages	5	36%
Some other way (please specify in Question C3 below)	1	7%

C3. Please add any further comments about reading messages

"I almost always read the first messages in a thread, then this gives me an idea of what the thread is about and if it is of interest to me. Sometimes the first few lines will bore me and I will mark a thread as read.

If I have not been in the conference for a while I will decide there is too many items to read so will just mark all as read to get a clean start for time management's sake."

"I access so many conferences that I tend to be very selective on which messages I read - if the title isn't clear about the subject matter I tend to skip it and come back later. I tend to read more messages in certain conferences, such as the CMA [computer-marked assignment] and ECA [end of course assessment] conferences."

"There hasn't been a great deal of messages in this forum, and the lack of a cafe reduces the number a good deal :) With a low volume you are able to read all messages (which I did, I only skipped a few on longer threads where I didn't think I could help with the problem).

If the forum was for a course with more students, such as T209, then I would have had to be more selective.)"

"Were there to be a lot more messages, I would probably do the same as I do on First Class and read first - last and then if interesting or relevant read rest of thread."

D. Useful Messages

D1. What proportion of the messages that you read were useful or helpful?

Less than 25%	4	29%
Between 25% and 50%	2	14%
Between 50% and 75%	5	36%
More than 75%	2	14%
All of them	1	7%

D2. How difficult was it to find useful or helpful messages?

Very difficult	0	0%
Quite difficult	3	21%
Quite easy	10	71%
Very easy	1	7%

D3. Please add any further comments about finding useful or helpful messages

"I am quite technically minded so not much is of use to me, however I find that trying to help others is quite rewarding. I hope this explains my answers to D1 and D2."
"Again, finding time has been difficult but finding useful and helpful messages in any conferencing system isn't easy (especially if there are a lot of messages!)"
"As above: the volume was quite low, everyone's working to the same ends so almost everything has some use."
"The reason I read all messages is because of experience in [FirstClass] of missing useful, even vital, ones. It would be useful if "someone" could flag critical messages/threads - not only ones that were delivered by [moderators]."
"Not everyone, myself included, understands the demarcation between different conferences. It takes time to understand exactly what goes where."

E. Overload

E1. Have you felt overloaded or daunted by the number of messages?

Yes – often	1	7%
Yes – sometimes	3	21%
No - not particularly	7	50%
No - not at all	3	21%

E2. What (if anything) has caused you to feel overloaded?
(Select all that apply)

Too many conferences	0	0%
Too many threads	2	14%
Too many messages in a thread	2	14%
Too many messages all with same title	2	14%
Too many unread messages	2	14%
Not being able to see which messages are replies to which	1	7%
Logging into the system late at the beginning	1	7%
Returning to the system after a gap of several days	5	36%
Returning to the system after a gap of over a week	0	0%
Something else (please specify in Question E4 below)	0	0%
I have not felt overloaded	8	57%

E3. Have you felt overloaded in any other group communication
systems you have used?

Yes - often (please specify the system or systems in Question E4 below)	2	14%
Yes - sometimes (please specify the system or systems in Question E4 below)	6	43%
No - not particularly	5	36%
No - not at all	0	0%
I have not used any other group communication systems	1	7%

E4. Please add any further comments about feeling overloaded

"E2: Not being able to hide all the messages I have read or marked as read. E3: Not knowing how to handle messages in the system."
"Number of messages, when you get 000's or 0000's."
"First Class can get very overloaded when a student is doing many courses, but that's a function of the courses and their conference requirements, not First Class itself."
"The T209 student forum was quite heavy."
"I found the Oct 2003 presentations of TT280 and TT281 overwhelming. There was too much to wade through and lots of polite unnecessary thanking and commiserating."
"E2 Note, none of these apply on TT380. But question again is whether this is because there are only a few students or because this application doesn't encourage over use, or because the course simply isn't hugely problematic! However currently on [FirstClass] on course M360, see TMA03 conference, it's got completely out of hand. I used to subscribe to CSS mail list but it delivers approx fifty messages a day. Far too much."
"FirstClass TT280 - huge amount of messages. I always read in case there was something useful or important that I was missing."
"FirstClass sometimes gets overloaded - but I think that's more to do with courses that have more people on them than this one. TT280 when I did it was a case in point...There are so [few?] people on this presentation that the messages are manageable."

F. System Features

F1. How useful did you find the Next/Prev options?

Very useful	1	7%
Quite useful	2	14%
Not particularly useful	2	14%
I did not use them	9	64%

F2. How useful did you find the Message History option?

Very useful	2	14%
Quite useful	6	43%
Not particularly useful	3	21%
I did not use it	3	21%

F3. How useful did you find the Search option?

Very useful	1	7%
Quite useful	5	36%
Not particularly useful	3	21%
I did not use it	5	36%

F4. Was it helpful to have separate frames for threads and for messages (rather than having all the messages listed together)?

Yes - very helpful	4	29%
Yes - quite helpful	4	29%
No - not particularly helpful	5	36%
No - it was unhelpful	1	7%

F5. Please add any further comments about system features

"My personal preference would be to have a single window with all messages of a single thread in, with links to a list of threads/conf at the top/bottom of the page, something like the link below: http://ukchatforums.com/display_threads.php?forumid=206"
"I hate the go to the first unread message, as this marks that as read. I use the read mark to know if I have read it or need to come back to it. This made announcements very hard to handle."
"I prefer an icon based system like First Class to a text based system like the TT380 conferencing system."
"Quite easy to use. There are some features of the FirstClass web system that are nice though – one thing is opening up a forum in a two-paned window, I rather like that feature."
"I found there wasn't enough room for all the bits on the screen, so I couldn't read anything properly. I prefer the layout of FirstClass. I also do not enjoy headings and links that scroll off a screen and found the ones in TT380 do that, which is annoying."
"F1 - what next/prev option? F3 - didn't work first time I used it, haven't used it since."
"Message History option could do with time and date. Could do with being able to resize text."
"I still prefer Firstclass - I like to see easily who has posted the messages and I like to "scan" the list of threads and messages. I am sure that a lot of my preferences are just because I am used to Firstclass. Also, the announcement board does not flag posts, so it is really easy to miss important messages."
"I found the separate frames confusing to start with, but got used to it after a while. I find having to manually refresh the frames slightly annoying."
"The screen can be busy looking with lots of text lists in different sections, maybe there could be some way to make the threads expand when necessary and contract when in a different thread."

Second online survey

A. Time Spent

A1. On average, how much time per week did you spend using the TT380 conferencing system during weeks 9-12 of the course?

Less than 30 minutes	2	12%
30 minutes to an hour	3	18%
1-2 hours	9	53%
More than 2 hours	3	18%

A2. How did the new conferencing features affected the amount of time you needed to spend?

They saved me time	6	35%
There was little difference	7	41%
They required more time	2	12%
I'm not sure	2	12%

A3. Please add any further comments about time spent conferencing

"Hiding older messages was a big help, and it was better not having to hide all the read messages, so I could go back to them"
"Reading all the messages reminds me of things I may have missed"
"My answer to A1 is an estimate - I think it varied from week to week"
"On dial-up, the whole process felt painfully slow. In comparison to First Class, where sometimes it feels particularly slow when a conference has a huge number of messages, this set up always felt slow."
"All my time was spent in the last 2 weeks of the course."
"Not sure if I noticed any particular difference in time spent conferencing - but I'm a bit of a conference-o-holic anyway :-)"

B. Reading messages

B1. Did you feel overloaded or daunted by the number of messages during weeks 9-12 of the course?

Yes – very	0	0%
Yes – somewhat	2	12%
No - not particularly	7	41%
No - not at all	8	47%

B2. What proportion of the week 9-12 conference messages did you read?

Less than 25%	1	6%
Between 25% and 50%	0	0%
Between 50% and 75%	4	24%
More than 75%	6	35%
All of them	6	35%

B3. How did you judge which messages to read? (Select all that apply)

From the thread or message title	7	41%
From the number of messages in the thread	3	18%
From the number of replies to the message	2	12%
From the message author	2	12%
By glancing at the message content	5	29%
From the number of votes for the message	0	0%
I only read messages in selected conferences	3	18%
I only read the Announcements	0	0%
I read all the messages	6	35%
Some other way (please specify in question B4 below)	1	6%

B4. Please add any further comments related to reading messages

"I try to read all messages, though I usually miss any course announcements, as I am still not used to having it [as] the very first thing I see, and instead select one of the conferences from the list at the top almost instantly.   *Maybe if after logging in, the course announcements appeared as a single framed page, it would allow me (and others who do the same) the chance to see them on their own, and require users to click an 'I've read the announcements, now take me to the conferences' button, which would then bring up the frames."*
"I start by reading each thread, but if I have no interest then I just click all the other messages in the thread to get rid of the unread flag."
"I read just about every message that started a thread, but when threads began to grow, and especially when messages were appearing days after the original post, I would often not read the later messages"
"You can't tell if a message is important by reading the title, I think you need to read every message (in conferences like ECA [end of course assessment] and Student Forum)."
"More than 90%. I think this is only due to the small number of people taking the course. Had more students been present and active it would have been overwhelming. I often felt irritated by feeling as though I would miss something unless I read every message. It was only towards the end that I started frequently marking threads as read. And then I would have liked the option to do this at the top level (because of slow response times)."
"I did read all the messages - but the selections I've made in B3 relate to how I prioritised the order I read them in - if that makes sense"!

C. Useful messages

C1. What proportion of the messages that you read during weeks 9-12 of the course were useful or helpful to you?

Less than 25%	2	12%
Between 25% and 50%	10	59%
Between 50% and 75%	5	29%
More than 75%	0	0%

C2. How difficult was it to find useful or helpful messages?

Very difficult	1	6%
Quite difficult	3	18%
Quite easy	12	71%
Very easy	1	6%

C3. Did the new conferencing features make it easier to find useful messages?

Yes - it was a lot easier	2	12%
Yes - it was a bit easier	8	47%
No - there was little difference	4	24%
No - the new features were a hindrance	0	0%
I'm not sure	3	18%

C4. Please add any further comments related to finding useful messages

"I kept forgetting that the new 'clipping' feature was present, so didn't take full advantage of it, even though I should have."
"I didn't really get round to using the new features"
"I think that the search feature needs to be much better, perhaps with advanced features. It seems to not find two words, only one, i.e. defaulted to all words or even worse, phrase. *Then when you find a message that might contain something interesting you have to go back to the conference and visually scan to find the thread"*

D. Voting

D1. How often did you use the option to votes for messages?

Never	15	88%
Sometimes	2	12%
Quite often	0	0%
Very often	0	0%

D2. Did you set a threshold (in the Filtering window) for the minimum number of votes?

No - I did not use this facility	17	100%
I tried it - but then I left the threshold set to zero	0	0%
Yes - and I generally worked with a threshold of 1 vote	0	0%
Yes - and I generally worked with a threshold of 2 votes	0	0%
Yes - and I generally worked with a threshold of 3 votes or more	0	0%
Yes - and I varied my threshold setting	0	0%

D3. How helpful was the facility to set a threshold for the number of votes?

Very helpful	0	0%
Quite helpful	0	0%
Not particularly helpful	0	0%
Unhelpful	0	0%
I did not use it	17	100%

D4. Please add any further comments related to the voting facilities

"Again, I forgot that such a feature had been introduced."
"I did not really think about this one, not much time to play with it."
"It never seemed to get going, so I think people left it alone."
"voting is a good idea but I guess people didn't really start using it much and I never quite got round to it. Could be very helpful."
"I didn't want to rely on other people's views about how important messages were, so I didn't vote or use the voting figures."
"I could see how it could be useful, I just didn't get round to using it much (I did use it once)."
"Not sure what the voting was for as I used the clipping system to mark useful messages"

E. filtering

E1. Which of the All/Recent/Unread filtering settings did you use?

I generally set my filtering to All	5	29%
I generally set my filtering to Recent	1	6%
I generally set my filtering to Unread	1	6%
I varied my filtering settings	0	0%
I did not alter my filtering settings from the system default	10	59%

E2. How helpful was the All/Recent/Unread filtering facility?

Very helpful	2	12%
Quite helpful	2	12%
Not particularly helpful	0	0%
Unhelpful	0	0%
I did not use this facility	13	76%

E3. Please add any further comments relating to the All/Recent/Unread options

"I found this when the number of messages got too many to handle."
"I think the 'Unread' option is useful, even though I didn't get round to using it"
"In a busier conference it would be helpful."

F. Clippings

F1. How often did you use the clippings facility?

Never	9	53%
Sometimes	6	35%
Quite often	1	6%
Very often	1	6%

F2. How helpful was the clippings facility?

Very helpful	7	41%
Quite helpful	0	0%
Not particularly helpful	1	6%
Unhelpful	0	0%
I did not use the clippings facility	9	53%

F3. Please add any further comments related to the clippings facility

"Kept forgetting it existed, so didn't use it as often as I could have."
"I did not really think about this one, not much time to play with it."
"I wish I'd made more of the facility - it's a really useful feature"
"Again, I think this is a useful feature, I just didn't use it"
"This was an excellent facility."
"I would have found the ECA conference far too big to wade through regularly, but I could clip anything relevant to the ECA, so I only had to read new messages."
"Only used once. Instead I copied and pasted text into notepad. I really miss the download feature in First Class."

G. Threading

G1. How helpful is it to see the branching structure of each thread (in the lower left-hand frame)?

Very helpful	10	59%
Quite helpful	6	35%
Not particularly helpful	1	6%
Unhelpful	0	0%

G2. How important is it to see which message is a reply to which?

Very important	8	47%
Quite important	8	47%
Not particularly important	1	6%
Not at all important	0	0%

G3. In the TT380 conferencing system, how easy is it to see which message is a reply to which?

Very easy	10	59%
Quite easy	4	24%
Not particularly easy	3	18%
Not at all easy	0	0%

G4. Please add any further comments relating to threading

"It might be nice to see a collapsible tree structure so when threads get longer you can open and close the branches."
"I liked the fact that to read another message in the same thread it was just one click away."
"The tree can be difficult to interpret when there are a lot of messages."
"It can look messy when the title is long, as the text wraps. But that's more a browser issue."
"I think threading is quite important - if it's used correctly - although often when people reply to messages, they aren't necessarily responding to the comment in the message they are replying to - if you follow me!"
"not obvious until a longer thread had built up and you could see the branching in operation"

H. User options

H1. Did you use the option (in the Filtering window) to chase new messages?

Yes - I always had this switched on	1	6%
Yes - I sometimes switched this on	0	0%
No - I preferred to leave this switched off	2	12%
I did not alter this setting from the system default	14	82%

H2. Did you use the option (in the Filtering window) to control the display order of threads?

I chose Descending (recent threads at the top of the list)	6	35%
I chose Ascending (recent threads at the bottom of the list)	0	0%
I did not alter this setting from the system default	11	65%

H3. Please add any further comments relating to these user options

"The order of threads seemed to change over night and I did not realise I could change the option. I think I would have liked to have new messages at the top not at the bottom as it seemed to be for me."
"Again, in retrospect this feature would have been very useful if I'd found the time to really evaluate it"
"I've no idea what 'chase new messages' even means ... :)"
"I preferred descending because then you don't have to scroll down to get to the most recent messages ..."

Appendix 4B
Feedback questions from the October 2004 presentation

The tables show percentages of those answering the question for each response option. The question numbers are those used in the course assignments.

Questions appended to the first assignment

21. Please indicate your prior experience of using e-mail. (Select all that apply.)

A	I have not used e-mail prior to this course	2%
B	I have used e-mail in connection with my studies	18%
C	I have used e-mail to communicate with friends and/or family	23%
D	I have used e-mail in my job	23%
E	I have used e-mail extensively for all or most of these activities	83%

22. Please indicate your prior experience of the Open University's FirstClass computer conferencing system. (Select one option only.)

A	I have not used FirstClass prior to this course	12%
B	I have some experience of First Class	40%
C	I have considerable experience of FirstClass	48%

23. Please indicate your prior experience of other group communication systems. (Select all that apply.)

A	I have no prior experience of other group communication systems	21%
B	I have used a ListServer (or other mailing list facility) for group communications	20%
C	I have used web-based discussion boards	61%
D	I have used newsgroups	41%
E	I have used other group communication systems	41%

24. Have you felt overloaded in any group communication systems you have used? (Select one option only.)

A	Yes, often	10%
B	Yes, sometimes	40%
C	No, not particularly	28%
D	No, not at all	10%
E	I have not used any other group communication systems	12%

Questions appended to the second assignment

21. On average, how much time per week have you spent using the TT380 conferencing system during weeks 3 to 6 of the course?

A	Less than 30 minutes	24%
B	Between 30 minutes and an hour	27%
C	Between 1 and 2 hours	36%
D	More than 2 hours	13%

22. How do you feel about the time you needed to spend?

A	It was not a problem	41%
B	It was just acceptable	41%
C	It was too much	17%
D	It was far too much	1%

23. What proportion of the conference messages did you read?

A	Less than 25%	40%
B	Between 25% and 50%	20%
C	Between 50% and 75%	9%
D	Between 75% and 100%	16%
E	All of them	15%

24. How did you judge which messages to read? (Select all that apply.)

A	From the thread title	60%
B	From the number of messages in the thread	3%
C	From the message title	22%
D	From the message author	3%
E	By glancing at the message content	14%
F	I read all the messages	10%

25. What proportion of the messages that you read were useful or helpful?

A	Less than 25%	38%
B	Between 25% and 50%	35%
C	Between 50% and 75%	20%
D	Between 75% and 100%	4%
E	All of them	3%

26. Have you felt overloaded or daunted by the number of messages?

A	Yes, often	28%
B	Yes, sometimes	27%
C	No, not particularly	28%
D	No, not at all	17%

27. What (if anything) has caused you feel overloaded? (Select all that apply.)

A	Too many threads	11%
B	Too many messages in a thread	16%
C	Too many unread messages	42%
D	Not being able to see which messages are replies to which	10%
E	I did not feel overloaded	41%

28. Was it helpful to have options (Next and Prev) for moving through the messages in a thread?

A	Yes, very helpful	28%
B	Yes, quite helpful	42%
C	No, not particularly helpful	8%
D	I did not use these options	22%

29. Was it helpful to have a facility (Message History) to see who had read a message and when?

A	Yes, very helpful	10%
B	Yes, quite helpful	37%
C	No, not particularly helpful	20%
D	I did not use this option	33%

30. Was it helpful to have separate frames for threads and for messages (rather than having all the messages listed together)?

A	Yes, very helpful	31%
B	Yes, quite helpful	56%
C	No, not particularly helpful	11%
D	No, it was unhelpful	2%

Questions appended to the third assignment

21. On average, how much time per week did you spend using the TT380 conferencing system during weeks 7-9 of the course?

A	Less than 30 minutes per week	42%
B	Between 30 minutes and an hour per week	27%
C	Between 1 and 2 hours per week	25%
D	More than 2 hours per week	6%

22. Have you felt overloaded or daunted by the number of messages during weeks 7-9 of the course?

A	Yes, often	14%
B	Yes, sometimes	22%
C	No, not particularly	46%
D	No, not at all	19%

23. What proportion of the week 7 to 9 conference messages did you read?

A	Less than 25%	46%
B	Between 25% and 50%	16%
C	Between 50% and 75%	13%
D	Between 75% and 100%	13%
E	All of them	12%

24. How did you judge which messages to read? (Select all that apply)

A	From the thread title	61%
B	From the number of messages in the thread	9%
C	From the message title	43%
D	From the message author	8%
E	From the number of replies to the message	4%
F	By glancing at the message content	21%
G	From the number of recommendations	1%
H	I read all the messages	10%

25. What proportion of the messages that you read during weeks 7 to 9 of the course were useful or helpful to you?

A	Less than 25%	44%
B	Between 25% and 50%	28%
C	Between 50% and 75%	16%
D	Between 75% and 100%	9%
E	All of them	3%

26. How helpful was the facility for users to recommend messages?

A	Very helpful	9%
B	Quite helpful	26%
C	It made little difference to me	61%
D	It was unhelpful	4%

27. Were the message filtering options (All/Unread/Recent/Recommended) helpful?

A	Yes, very helpful	14%
B	Yes, quite helpful	27%
C	No, not particularly helpful	19%
D	I did not use them	40%

28. Which of the filtering options did you use?

A	I generally set my filtering to All	19%
B	I generally set my filtering to Unread	9%
C	I generally set my filtering to Recent	1%
D	I generally set my filtering to Recommended	0%
E	I varied my filtering settings	16%
F	I did not alter my filtering settings from the system default	55%

29. Was the Clippings facility helpful?

A	Yes, very helpful	1%
B	Yes, quite helpful	27%
C	No, not particularly helpful	14%
D	I did not use it	58%

30. Was it helpful to see the branching structure of each thread (in the lower left-hand frame)?

A	Yes, very helpful	31%
B	Yes, quite helpful	59%
C	No, not particularly helpful	10%
D	No, it was unhelpful	0%

31. Was it helpful that users were encouraged to enter their own subject title for a new message?

A	Yes, very helpful	18%
B	Yes, quite helpful	54%
C	No, not particularly helpful	3%
D	No, it was unhelpful	21%
E	No, it was very unhelpful	4%

Appendix 4C
Survey from the October 2004 presentation

The tables show numbers and percentages of respondents for each response option.

Your Experience

1. How would you describe your prior experience of group communication systems ?

I am very experienced	8	73%
I am fairly experienced	3	27%
I am not particularly experienced	0	0%

2. How would you describe your level of activity in the TT380 Message Forums conferencing system?

I was very active	1	9%
I was fairly active	7	64%
I was not particularly active	3	27%

3. What was your perception of overload, or otherwise, in TT380 Forums?

I felt very overloaded	0	0%
I felt fairly overloaded	2	18%
I did not feel overloaded	9	82%

Message Threading

4. The TT380 Message Forums system lists threads in one pane (top left) and messages in another (bottom left). Please give your views on this arrangement.

"I found this quite helpful"
"Irritating. Without clicking through, I couldn't see who was writing about what"
"For me this wastes much of the available screen area - the content of the messages should be given more prominence."
"I like this layout. It worked well for me."
"Good idea. Made the view less cluttered, easier to keep track of the threads"
"Worked for me"
"Excellent fast response and allows one to be selective [as] to where to go next (the next in thread or a totally new thread) positioning was easy to read too"
"OK but the overall effect with the conferences at the top was a bit cluttered and rather small"

> *"I prefer the [FirstClass] system where you can see the message lists for more than one thread at a time. I also found it frustrating not being able to see who posted the top message in a thread before going to read it."*

> *"This works well, although long threads start to be a bit awkward to follow. It seems that 1024x768 screen really is a minimum."*

> *"It was a good arrangement, made it easy to see what the messages in the selected thread were."*

5. In the first version of Message Forums, messages in a thread were shown as a simple list, whereas in the second version a branching structure was used. Please say which you preferred, and why.

> *"Branching structure was preferable - much easier to follow a particular thread"*

> *"Branching, because I could see who was responding to which part of a "conversation". This was best when someone changed the subject title too and people actually developed themes along separated tracks"*

> *"A branching structure is more appropriate since often messages refer to the immediately preceding message rather than directly to the parent message in the thread. A simple list is misleading."*

> *"Branching, it was easier to link related messages together."*

> *"Also made it easier to keep track of who was answering to what"*

> *"The second version was easier to use"*

> *"Cannot remember the first thread sorry"*

> *"Branching better as easier to follow a thread"*

> *"Branching structure, definitely. It was very difficult to follow the track of a "conversation" in the first system. If everyone suitably quoted, it would not be so difficult, but sometimes what appears to be sufficient quoting can be insufficient for another user to gain context, particularly if there is a gap of hours/days between reading the message and its reply. At least with the branching you can easily identify which [message] to go back to in order to gain context"*

> *"Branching structure is more familiar, and helps identify which strand of a thread the message belongs to."*

> *"I preferred the branch structure as it gave you any idea as to who was replying to which message."*

6. The Message Forums system encourages users to enter their own message title when replying to a thread. Please give your views on this feature.

> *"It would have been helpful to be able also to just select the same title for a reply - unless this was provided and I missed it!"*

> *"Wholly admirable in concept and largely useless in practice. Some people will always go for the default - usually when changing the subject! - while others will change the heading but only in the second part of the title where it can't be seen in normal display"*

> *"This feature (which I found not to be particularly helpful) only works if people enter sensible subject lines. If they don't then there is no advantage over retaining the original subject for the entire thread."*

> *"It did help avoid threads becoming irrelevant to the subject, but did not avoid the problem that they were not really the same thread any more and so should not have been branched together."*

"Good idea, especially if just thanking someone for a reply, made it more obvious".
"Not sure, we could end up with just too many threads with very few messages in them"
"Good idea indeed - but may encourage users to just stick in a title and no message - as was the case during my time on the course which led me to read into messages unnecessarily
"I would have preferred an option to automatically continue the thread. If someone wants to make another point it should probably be a different thread"
"I think it is a good idea. It was better without the extra warning dialog that appeared in the early version - this then became a pain. Having been encouraged to change the title, I found myself choosing the default and then editing it in a way I wouldn't have bothered to on FC. Whether people found my changes helpful is another question."
"I didn't like this - I generally use the same title as the original thread, and add to it if appropriate. Effectively it meant I had to click the default checkbox every time.
"It's a good idea, but at times seems tedious."

Recommendations

7. The second version of Message Forums has a facility for recommending messages. Please give your views on this feature, comment on whether you used it.

"I didn't use this"
"I didn't use it to recommend anything and used it once as a filter just to see how it worked. *I didn't recommend anything because my interests and views on relevance relate to my needs and there's too little time in a 12 week course to know enough about others to develop the brass neck to tell them what to read.* *I didn't use it as a filter because no-one else was really recommending either"*
"I marked a couple of messages as "recommended" - however as the facility wasn't widely used there was little benefit in filtering based on recommendation."
"This seemed a good idea, but for me would only have been valuable if I had some measure of the person making the recommendation. The concept of one contributor recommending a message for no reason does not seem useful. I might recommend a message because it clearly explains a concept which others simply did not have a problem with."
"Didn't use it"
"Don't really use"
"Did not use this feature"
"Not used as what I think is useful may not appeal to someone else"
"Didn't use it. I wasn't aware of any [messages] that had been recommended, and the only time I recommended one was when I clicked on the wrong link by mistake."
"I used this a bit, although it probably is something that the particular subject matter didn't need. I think I would use this more with time."
"I didn't use it, but I think it's theoretically a good idea, though perhaps not every one would be impressed with others' recommendations."

Filtering

8. The second version of Message Forums has a facility (all, unread, recent, recommended) for filtering messages. Please give your views on this, explaining whether any of the options were helpful to you.

"The unread filter was quite helpful at times - I didn't use the other filters"
"The unread filter was handy on occasion, although I was usually leaving it set to 'all'. There was so little traffic that it wasn't really necessary to filter. *If no-one's doing any recommending, the recommended filter's not particularly helpful* *It would have been lovely to have a 'never show me this again' facility plus a filter to drop these messages from those displayed to me - an equivalent to deletion"*
"After experimenting with the options I just read everything anyway!"
"I can see this may be useful, but prefer to see all the messages with an indication of what is read/not read. I often return to an earlier message to see the context of a response so don't want to hide them".
"Didn't use it"
"Did not use"
"Excellent - I feel a user can never have enough options for filtering and organising search results to suit their own needs - helps one work more efficiently (especially when the pressure is on)
"Not used much as I can already see what I've read and if a new message is added to a thread you sometimes want to be able to see the drift of the arguments,
"The one time I tried it, it took me a while to realise it was doing anything - it seemed to list all the [messages] still, but some greyed out. I didn't find that helpful, as I still had to search the list of threads to find threads with unread [messages]. Viewing only unread [messages] is something I sometimes find helpful tho".
"I didn't use this much as the message volume didn't warrant it. I would have used the unread if there had been enough messages, and recommended in time. I doubt I would use recent though."
"I didn't use it"

Clipping

9. The second version of Message Forums has a facility for 'clipping' messages. Please comment on whether you used this, and if you did, whether it was helpful to you.

"I used this and found it quite useful - any means of saving them permanently somewhere?"
"I did use this as a substitute for working offline and being able to delete messages which were of no lasting interest to me. I also used it to keep messages with interesting tips, specific points about the ECA (especially if I hadn't got to that bit yet) and some stuff about Apache, which I haven't used but want to look at. (If you were paying attention during the course, this survey response is no longer anonymous!) If there had been an offline option, I could have saved all of these into my own PC rather than laboriously copying them out"
"I found this more useful than I originally thought, but a major drawback is that the clippings are stored centrally. A mechanism to save to a local file would be beneficial."

"Yes I did, I clipped anything which seemed significant about the ECA then reviewed the clips when completing the ECA. Good feature."
"Good idea, wish I'd remembered to use it more often!"
"I would like to be able to download a thread as my Internet connection is slow so off line browsing would be useful"
"Did not use this feature"
"Very useful as I could save things which were particularly pertinent"
"I did use it, and it was helpful, but I would prefer to have a copy of the messages on my own computer so I can delete unwanted [messages], and keep those I want with general points for as long as I need. A lot of useful messages have points that may be helpful beyond the course if I continue to use ColdFusion or MySQL, and it is going to be a pain to find some appropriate storage location for them."
"I used this a bit - again I would expect to use a lot more in time. Extra comments: Can we have an archive copy of the data from the forum? An sqldump would do. I do prefer an offline type system, even though I tend to work online. I also don't mind my name being with my comments. *Cheers* *[respondent's name]"*
"I didn't use it."

Appendix 4D
Testing for statistical significance

In order to compare students' responses when using the 'basic' and 'enhanced' version of the conferencing system, similar questions on information overload were included in two of the computer-marked assignments (CMAs) for the October 2004 presentation of TT380. Students completed CMA42 when using the 'basic' version and CMA43 when using the 'advanced' version. The data for two of the questions indicated a difference in students' responses. The analysis below investigates whether this difference was statistically significant.

Of the 110 students initially registered on the course, 89 submitted CMA42 and 79 submitted CMA43. Not all students answered the feedback questions, and the percentages answering varied between questions. It was necessary to treat the students answering questions in CMA42 and in CMA43 as if they were two independent groups. This was because answers for individual students were not available via the CMA handling system, and therefore pair-wise comparisons for each student could not be made.

In order to choose a suitable statistical test, the following points were taken into account.

1. No assumptions could be made about the distribution of the data, and in particular the data could not be assumed to follow a normal distribution. A non-parametric test was therefore necessary.

2. As explained above, pair-wise comparisons for individual students could not be made. Therefore it was necessary to treat the 'basic' and 'advanced' data as if from two independent samples.

3. The response options (e.g. 'often', 'sometimes', 'not particularly', 'not at all') had an order, rather than just being categories, but there was no measure of the distance between the different values. The data is therefore classified as ordinal (rather than nominal or interval) data.

Point 1 means that a non-parametric test must be used. Points 2 and 3 determine which non-parametric tests are suitable (Seigel, 1956). The Mann-Whitney U test is normally chosen under the above set of conditions, although other, less well-known tests can also be used. The Mann-Whitney U test was therefore selected for assessing the significance of the data.

1. Data on feelings of overload

One of the questions in CMA42 asked students:

> 'Have you felt overloaded or daunted by the number of messages?'

and offered options:

A Yes, often
B Yes, sometimes
C No, not particularly
D No, not at all.

The equivalent question in CMA43 asked:

> 'Have you felt overloaded or daunted by the number of messages during weeks 7-9 of the course?'

and offered the same set of options.

For CMA42, the percentages of students selecting each option are given in the second column of Table 1. These were the values recorded by the Open University's assignment handling system, and are percentages of all the students who submitted the assignment i.e. of 89 students. Converting these percentages to numbers of students is not an exact process, due to rounding errors - those in the data received from the OU assignment handling system and those in the conversion of the percentages to whole numbers of students. The third column of the table gives the numbers of students, to the nearest whole value. It appears that a total of 68 students answered this question.

The fourth and fifth columns of Table 1 give the equivalent data for the same question in CMA43. The percentages in the fourth column are of the 79 students who submitted this assignment. It appears that a total of 62 students answered this question.

Answer option	Percentage choosing the option in CMA42	Number choosing the option in CMA42	Percentage choosing the option in CMA43	Number choosing the option in CMA43
A. Yes, often	21%	19	11%	9
B. Yes, sometimes	20%	18	17%	13
C. No, not particularly	21%	19	36%	28
D. No, not at all	13%	12	15%	12
Total		*68*		*62*

Table 1   **Responses on feelings of overload**

2. Data on time spent conferencing

One of the questions in CMA42 asked students:

> On average, how much time per week have you spent using the TT380 conferencing system during weeks 3 to 6 of the course?

and offered options:

A Less than 30 minutes
B Between 30 minutes and an hour
C Between 1 and 2 hours
D More than 2 hours

The equivalent question in CMA43 asked:

> On average, how much time per week did you spend using the TT380 conferencing system during weeks 7 to 9 of the course?

and offered similar answer options.

For the question in CMA42, the percentages of students selecting each option are given in the second column of Table 2. Again, these are percentages of the 89 students who submitted the assignment. In the third column these values are converted to whole numbers of students. It appears that a total of 70 students answered this question.

The fourth and fifth columns give the equivalent data for the same question in CMA43. The values are based the 79 students who submitted the assignment. It appears that a total of 64 students answered this question.

Option	Percentage choosing the option in CMA42	Number choosing the option in CMA42	Percentage choosing the option in CMA43	Number choosing the option in CMA43
A. Less than 30 minutes	19%	17	34%	27
B. Between 30 minutes and an hour	21%	19	22%	17
C. Between 1 and 2 hours	28%	25	20%	16
D. More than 2 hours	10%	9	5%	4
Total		*70*		*64*

Table 2 **Responses on time spent conferencing**
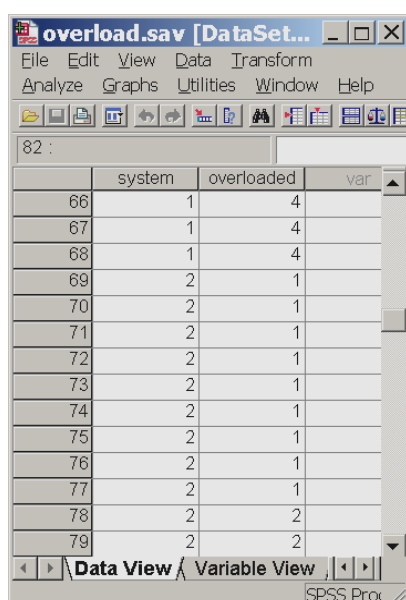
3. Using the Mann-Whitney U test

The Mann-Whitney U test can be used to test differences between two conditions, when different groups of participants have been used. The test relies on ranking the data values taken together as a whole dataset. The ranks in each group are then totalled separately to give two rank totals. The Mann-Whitney U statistic can then be calculated from the rank totals and group sizes, and assessed for significance. These procedures can be carried out using equations and data tables (see Siegel, 1956, pp. 116-127) or statistical software such as SPSS (see Field, 2005 pp. 521-533).

The data for the two questions detailed in Sections 1 and 2 above were tested for significance using the Mann-Whitney test. The data values were input to SPSS as two datasets. One dataset was for the question on feeling overloaded and one dataset was for the question on time spent conferencing. In each case, data from students answering the question in CMA42 was compared with data from students answering the question in CMA43. A Mann-Whitney test was than carried out for each dataset, using SPSS.

4. Analysis of data on feelings of overload

The numbers of students from Table 1 were loaded into the software. Each student response was entered as a separate row (see Figure 1). In the first column, a code of '1' was used to represent a response to CMA42 and code of '2' a response to CMA43. In the second column codes '1' to '4' represented the response options 'Yes, often' through to 'No, not at all'.

Figure 1   Example of the data input to SPSS

The SPSS facility

Analyze > Nonparametric Tests > 2 Independent Samples

was then run. The output is shown in Figure 2.

Ranks

1= basic version; 2=		N	Mean Rank	Sum of Ranks
1= often; 2= sometimes; 3= not particularly; 4= not at all	1	68	59.80	4066.50
	2	62	71.75	4448.50
	Total	130		

Test Statistics[a]

	1= often; 2= sometimes; 3= not particularly; 4= not at all
Mann-Whitney U	1720.500
Wilcoxon W	4066.500
Z	-1.880
Asymp. Sig. (2-tailed)	.060
Exact Sig. (2-tailed)	.060
Exact Sig. (1-tailed)	.030
Point Probability	.000

a. Grouping Variable: 1= basic version; 2= enhanced version

Figure 2   Output from SPSS for feelings of overload

The value of U calculated was 1720.5. The significance value was p = .06 for a two-tailed test and p = .03 (half the two-tailed value) for a one tailed test. Because a directional research hypothesis was being investigated (that the degree of reported overload would be lower in CMA43) the value for a one-tailed test is the appropriate one. The significance level is therefore p = .03.

As a check, the calculation of U was repeated using a spreadsheet and the equation from Siegel (1956). This resulted in the same value for U.

5. Analysis of data on time spent

The numbers of students from Table 2 were loaded into the software. In the second column codes '1' to '4' represented the response options 'Less than 30 minutes' through to 'More than two hours'.

The output from SPSS is shown in Figure 3.

Ranks

1= basic version; 2=		N	Mean Rank	Sum of Ranks
1 = <30mins; 2 = 30 mins - 1hr, 3= 1-2hrs, 4= >2 hrs	1	70	74.96	5247.00
	2	64	59.34	3798.00
	Total	134		

Test Statistics[a]

	1 = <30mins; 2 = 30 mins - 1hr, 3= 1-2hrs, 4= >2 hrs
Mann-Whitney U	1718.000
Wilcoxon W	3798.000
Z	-2.430
Asymp. Sig. (2-tailed)	.015
Exact Sig. (2-tailed)	.015
Exact Sig. (1-tailed)	.007
Point Probability	.000

a. Grouping Variable: 1= basic version; 2= enhanced version

Figure 3   Output from SPSS on time spent conferencing

The value of U was 1718.0 with a two-tailed significance of p = .015 and therefore a one-tailed significance value of p = .0075.

As a check, the calculation of U was repeated using a spreadsheet and the equation from Siegel (1956). This resulted in the same value for U.

6. Concluding comments

The analyses reported here demonstrate a method for examining the statistical significance of the data. These analyses indicate that:

- the difference in feelings of overload was significant ($p < 0.05$);

- the difference in time spent conferencing was significant ($p < .01$).

However, there are a number of problems in applying this statistical approach to the research data. Firstly, the student cohort was not a random sample of a larger population. Secondly, the two groups of respondents (those answering equivalent questions in CMA42 and CMA43) were not independent samples; instead the groups were largely made up of the same students. Thirdly, the data did not approximate to a continuous distribution, but instead consisted of four ordered categories; this meant that there were large numbers of tied rank values, and this may have affected the validity of the test calculations. Finally, it is important to note that the difference between students' responses may not be caused by the change from the 'basic' to the 'enhanced' version of the conferencing system. There may be other reasons for students' responses being different later in the course.

Appendix 5A
Feedback questions from the October 2005 presentation

21. Did you put any information into your résumé?

A	Yes, quite a lot	8%
B	Yes, a bit	57%
C	No	35%

22. If you did not put information into your résumé, why was this?

A	I couldn't see any reason to	38%
B	It would take too long	15%
C	I didn't get round to it	23%
D	I don't want others to have personal information about me	23%
E	Some other reason	35%

23. Have you looked at other students' résumés?

A	No	49%
B	Yes, one or two	39%
C	Yes, quite a few	12%

24. Had you used an instant messaging system before starting TT380?

A	Yes, often	57%
B	Yes, once or twice	26%
C	No	17%

25. Had you used a synchronous (real-time) chat system before starting TT380?

A	Yes	71%
B	Yes, but only in FirstClass	7%
C	No	22%

26. Have you used the TT380 instant messaging facility ('TT380 Community' at the top left of the screen)?

A	Yes, often	3%
B	Yes, once or twice	25%
C	No	72%

27. If you have not used the instant messaging facility, why was this?

A	I couldn't see any reason to	35%
B	I didn't get round to it	21%
C	I didn't find many people online when I was connected	13%
D	I don't want to contact people I don't know	12%
E	I didn't know about it	12%
F	Some other reason	17%

28. Is online contact with other students on the course important to you?

A	Yes, very	12%
B	Yes, fairly	41%
C	No, not really	34%
D	No, not at all	13%

29. Do you think synchronous (real-time) communication in a course conferencing system can help to create a sense of community?

A	No	4%
B	Not really	10%
C	Yes, somewhat	59%
D	Yes, considerably	15%
E	Not sure	12%

30. Is it important to you to feel part of a community of students on the course you are studying?

A	Yes, very	10%
B	Yes, fairly	29%
C	No, not really	42%
D	No, not at all	16%
E	Not sure	3%

Appendix 5B
Survey from October 2005 presentation

Résumés

1.1 Was it helpful to have other students' résumés available?

No - not at all	3	17%
No - not particularly	5	28%
Yes – fairly	9	50%
Yes – very	1	5%

1.2 Do you think it is helpful to have photos in résumés?

No - not at all	2	11%
No - not particularly	6	33%
Yes – fairly	6	33%
Yes – very	1	5%
I'm not sure	3	17%

1.3 Did you make contact with any other students on the basis of their résumé?

No – never	18	100%
Yes - once or twice	0	0%
Yes - quite a few times	0	0%

1.4 Please add any further comments you may have relating to résumés.

Although didn't make contact specifically based on résumé (by the way could call it something not requiring special characters - eg 'background'), did look at résumé when had one-to-one contact (IM and email) to see who I was talking to.
Didn't really look at the résumés. Contacted some people based on their input to the forum questions and this was a gauge as to whether you would get a valid answer or help. ;0)
The few I looked at had very little content, they are only useful if used!
I commented in the Forums on the fairly low level of messages - especially in the Cafe. I believe that it takes time to get used to using new facilities. I haven't looked at the résumés (or any photos) this time, but maybe that is something that I might do in the future. Maybe some greater emphasis on getting résumés set up and then getting people to read them might be useful. As it is I have been very busy (work, family, school governors, parish council) during the course and have had to focus on the minimum. I don't really have time to answer this as I am off to Madrid in a couple of hours for work!
Not used enough

Useful to have a guide as to length - I wrote an embarrassingly long piece but lacked the energy to change it.
Very rarely used them
It's been more to get a sense of who you are talking to than to make contact on the basis of what they have said in their résumé
Clearly FC has this feature too - sometimes interesting to see what people have written but never critical. To be honest I don't usually write anything because I don't look at other peoples much. Pictures? - might be useful if you want to have a dating site sideline ;-))

Instant messaging

1.5 Did you use the 'TT380 Community' area (top left of the screen) to see who else was online when you were conferencing?

No - I did not use this	2	11%
I tried this once or twice	4	22%
Yes - I used this fairly often	9	50%
Yes - I used this most times I logged on	3	17%

1.6 If you initiated any TT380 instant messaging sessions (using 'TT380 Community') whom did you contact? (Select all the options that apply)

I did not use this facility	9	50%
A student whose résumé interested me	0	0%
A student who just happened to be online when I was	1	6%
A student I recognised from their conference contributions	2	11%
A student I knew from another course	0	0%
A course moderator or tutor	6	33%

1.7 If another student tried to contact you using instant messaging, did you generally accept or decline?

No-one tried to contact me	10	55%
I generally used the option to decline all invitations	2	11%
I generally used the option to decline that particular invitation	1	6%
I only accepted if I already know the person contacting me	1	6%
I generally used the option to accept	4	22%

1.8 If you used the TT380 messaging, for what purpose was this (select all the options that apply)

I did not use this facility	7	39%
To ask a course moderator a question	3	17%
To socialise	0	0%
To discuss the content of the course	7	39%
For some other purpose	1	5%

1.9 If you used the TT380 instant messaging, did you find it useful?

I did not use it	8	44%
No - not at all	2	11%
No - not particularly	2	11%
Yes – fairly	3	17%
Yes - very useful	3	17%

1.10. Please add any further comments you may have relating to TT380 instant messaging.

Found it slightly useful, but frustratingly slow. Easy for messages to get crossed. I use MSN Messenger a lot and find the facility on that where it tells you other person is typing helpful to stop you also doing a message at same time.
I find I am usually too busy to chat with other students, in any of the forums, because before you know it you could have 'lost' an hour or more so I tend to avoid messaging.
I wasn't particularly sure it was "alerting" as 50% of the alerts (although I didn't do many) nobody responded so.....? It was good but the refresh kicking in was a bit annoying and I wasn't alerted when someone DID respond (or I didn't notice it?) and missed the communication as I was busy coding ;0(
I found it very disappointing as no-one I contacted ever responded, which was a huge disincentive
One person tried to contact me. I accepted, but they had logged off before I replied!
For some other purpose in 1.8 was to obtain instant help for a problem I was having and vice versa.
I think people may be logged in but inactive, so this could be why they do not respond? Perhaps there were not enough of us on this course to make it worthwhile?
There is a problem with pop-up blocking which needs to be solved before this can be really useful.
I kept pop-ups blocked so don't know if anyone was trying to contact me. I feel a bit intimidated by real time chat and prefer email.
I tried using IM on two separate occasions to contact a mod [moderator] with a burning (to me) question. It was the same mod both times and he seemed to instantly vanish from the forums (no decline, just vanished). Honestly I [am] not that bad a person! Other students tried to IM me a couple of times but as I was just sneaking a look at the forums from work it was not appropriate for me to accept so I declined - maybe an online but busy setting?

Synchronous chat

1.11 Would it be helpful to have a synchronous chat facility where more than two people could take part?

No - not at all	2	11%
No - not particularly	5	28%
Yes – fairly	6	33%
Yes – very	3	17%
I'm not sure	2	11%

1.12 Would it be useful to have scheduled chat sessions with a course tutor, which students could join?

No - not at all	0	0%
No - not very useful	2	11%
Yes - fairly useful	7	39%
Yes - very useful	7	39%
I'm not sure	2	11%

1.13 Please add any further comments you may have relating to TT380 instant messaging.

Although given workload on this course I could see it could take up a lot of time. Also if this was a facility it would be helpful to have the string of chat saved for anyone who was not available at the time to view it. And anyway, given everyone working to different timeframes it could easily exclude people and the message forum is better so no-one misses things.
I have been very disappointed with this conference as compared to First class, as it seems much less user friendly somehow. However, I would have to balance that by saying 1) I had much less time than usual to take part & keep up to date 2) I had mega computer problems for 2 weeks mid-course & then found it difficult to recover lost ground 3) When I was really desperate about getting started on the coding I had fantastic help from fellow students & [moderators' names] (thanks) Generally speaking I would love to see a VLE such as Moodle.... so hope the plans go ahead.
Why not try it out?
As the time progressed I came to use the facility more. It gives a more personal experience to have a real time conversation with people one reads postings from.
I hit problems in setting up MySQL locally and felt it was not really a topic for the forum as it was specific and not 100% relevant to course. Sync chat may have helped.
There's already a high reliance on having some students help others in these TT courses, having such a chat facility without tutor participation would just increase this.
Why not have desktop sharing and/or VC facilities too? Like a souped up MSN Messenger or old NetMeeting. Are you guys totally wedded to a browser based, scripted environment or are you looking at fat client too (or both)? I've always found fat client more functional and ergonomic but it's good to have browser based access (pref to all functionality) so you can access from third party PC's (Work, web cafe, friend/relation, etc.). BTW - virtual present very nice but no way to virtually open it!

Appendix 5C
Feedback questions from the February 2006 presentation

Questions appended to the first assignment

21. Did you put any information about yourself into your Forums résumé?

A	I included information about family/hobbies	38%
B	I included information about my work	18%
C	I included information about my studies	22%
D	No, I did not put any information about myself into my résumé	49%

22. If you did not put information into your résumé, why was this?
(Please select all options that apply)

A	I couldn't see any reason to	23%
B	It would take too long	16%
C	I didn't get round to it	58%
D	I don't want others to have personal information about me	12%
E	I didn't know what to write	19%
F	Some other reason	5%

23. Have you looked at other users' résumés?
(Please select all options that apply)

A	I looked at the résumés of some students who had posted messages	30%
B	I looked at the résumés of some students who were online	17%
C	I looked at the résumé of one or more conference moderators	11%
D	I searched the résumés	17%
E	I didn't look at any other users' résumés	57%

24. Had you used a synchronous communication facility (e.g. instant messaging or real-time chat) before starting TT380?

A	Yes, often	41%
B	Yes, once or twice	35%
C	No	24%

25. Have you used the TT380 instant messaging facility (accessible via the 'TT380 Community' link at the top left of the screen)?

A	Yes, often	2%
B	Yes, once or twice	7%
C	No	91%

Questions appended to the second assignment

21. Did you find it helpful to have other students' résumés available?

A	Yes, very	0%
B	Yes, fairly	31%
C	No, not particularly	48%
D	No, not at all	21%

22. Did reading other students' résumés help you feel that you knew them better?

A	Yes, definitely	6%
B	Yes, somewhat	30%
C	No, not particularly	32%
D	No, not at all	1%
E	I didn't read any résumés	31%

23. Do you think it is helpful to have photos, or other visual representations of users, in résumés?

A	Yes, very	1%
B	Yes, fairly	31%
C	No, not particularly	42%
D	No, not at all	16%
E	I'm not sure	10%

24. Is it important to you to have contact with other students via a course conferencing system?

A	Yes, very	30%
B	Yes, fairly	39%
C	No, not really	25%
D	No, not at all	6%

25. Do you think synchronous communication facilities (such as instant messaging or real-time chat) in a course conferencing system can help to create a sense of community?

A	No, not at all	4%
B	No, not really	20%
C	Yes, somewhat	49%
D	Yes, considerably	15%
E	I'm not sure	12%

26. From a personal perspective, is it important to you to feel part of a community of students on the course you are studying?

A	Yes, very	11%
B	Yes, fairly	40%
C	No, not really	29%
D	No, not at all	17%
E	I'm not sure	3%

Appendix 5D
Survey from the February 2006 presentation

Community

1. Was it important to you to feel a sense of community on this course? On other courses you have studied (if any)?

These TT courses are the only ones I have studied in this way. Most of my other studies have been of the usual classroom variety - where community comes naturally - or my own private self-teaching. I'm not sure about 'important' but it certainly has been helpful to have peer opinions, sometimes fun and, yes, sometimes distracting. These web-based IT courses certainly need some sort of peer feedback, so I suppose it has been important.

I think it is important as it can provide an inspiration when lack of motivation is a problem.

It was not important to me as I knew that the times at which I could study (which was compounded by the Just In Time release of study materials) meant I would not be current with anybody else.

Like most human beings I like to feel as though I'm part of the pack and as such I very much like to identify myself with others on the course. So yes it is for me very important that a course offers a sense of community. All my courses with the OU have been online and I am in regular communication with fellow students from 2003, thanks to the OUSA [OU Students Association] suite of social conferences on FC [FirstClass].

I didn't expect this from distance learning, but I deduce that a sense of community is important to me because I have participated in every First Class conference for every course I have done. (12 courses). Even if I don't post much myself, I like to see how the group is doing. This applies even if most students do not participate: my definition of 'group' happily shrinks to those who post.

I have to be honest and say that I did not feel it necessary to have a 'sense of community'. I have a very busy life and I am also studying five courses at the moment, all of which want me to take time out from my studies to contribute to conferences, so in that way I have found it quite irritating and time consuming. That is not to say that I do not think that it is a useful tool, it is great if you have a query and negates the need for the moderators to reply to every one individually, I just feel that contribution should be optional. Those who want to ask questions or discuss things related to work can and those who want to chat and make new friends can do that too, and those of us who just want to get on with our own work and just ask the odd necessary question should have that choice.

No, why should I?

Tricky question this ... the answer is yes and no. Was it important to me? Yes, because it's a shared learning experience and I tend to work better in a shared work experience. On this and other courses, I have learnt a heck of a lot by reading other posts and asking the odd question or three. But does this equate to a sense of community? probably not ... it's a bit like a character in a book, film or soap opera ... if you care about a character (usually from learning more about them during the course of the film) you tend to feel for them ... but it is very difficult to 'feel' for someone based on a short résumé and a few messages.

Community isn't quite what I'd call it, though some names become familia.r

Yes, it helps to realise that others are in the same boat.

I like to read what other students have to say about ongoing work and other things. I'm not too sure that this involves a 'sense of community'. In the case of this course I found the message forum - unfamiliar, clunky and unattractive. It has been therefore the one course with which I have used the [conferencing] system only for strictly pragmatic

and practical purposes. I look forward with pleasure to never seeing the appallingly unattractive and dysfunctional and misnamed 'forum' again. Ironically, I really liked the course - but not the damned forum!."

No, but useful for hints and tips.

Yes, I think it helps to feel that you are all in the same boat :-)

Yes.

2. Can you gain a sense of community purely through online communication? If so, is reading/writing conference messages better for this, or is instant messaging/chat better?

In life in general, no, but for short courses like these, yes. I prefer the conference idea - it gives time to read, absorb, check things out, compose replies...that's for the serious curricular stuff; the instant messaging is handy to have for those who are available and have the time for ad hoc, extra-curricular, maybe fun stuff.

Yes, I believe that you can gain a sense of community. Any form of communication is required for this, although the more instant it is, the better.

I find it difficult to feel a sense of community in any electronic media. I have only felt this sense on OU courses by attending tutorials and day schools where they were present. Of the two choices conferencing is better.

In my view definitely. I think there is a place for both methods. The messenger for idle banter for those with an interest and the conference system for more considered and inclusive debate. Having said that, the type of conference system used and how comfortable / accessible it is for the user has a direct bearing on how included a student feels (as we have sadly found out on this course) - in my opinion of course.

Yes, online communication helps to build a sense of community. I have never used instant messaging so I cannot compare it. I like to have the time to work on my messages because I am a bit slow with written communications.

I think some people can and find it very helpful to be part of a group. I personally don't like impersonal forms of communication other than for business issues. If I had more time I would probably enjoy discussing course related subjects on an impersonal level. However, I find it very hard to spend enough time with my existing friends and often feel that I have been neglectful when I have not spoken to them for a while, so to engage in small talk with people I don't know and am not likely to meet seems a little hollow.

I imagine it depends very much on the individual. I doubt if I can.
If I have to chose then I would choose conferencing. In fact I use [FirstClass] quite a bit but I don't feel part of a 'community'.

In my opinion, no. Community implies social interaction which is usually based on face to face contact. Faces tell the whole story ... online messages or instant chat tell you nothing about the person. You can hide behind any disguise and no one will ever know. For example, in a résumé one could put that one is super fit and does triathlon races (as in mine) but how do you know that I do ... I could be a very large bloke with a liking for drinking vast quantities of beer, watching TV and pretending to be someone else in a chat room. And you would never know ... It is this 'not knowing' that inhibits a true sense of community.

Conference messages are sufficient. I cannot IM people to whom I have not been introduced - I have to know them first, or it is too intrusive.

Yes. I feel that both methods complement each other.

No, never having met the other students you cannot be a part of a community.

I think it's difficult but that's not to say it can't happen. I am only able to be online at

certain, irregular times so for me I think reading/writing conf messages is best because you can catch up. The general layout and organisation of the conference can really help here. The best conferences I have seen have involved [tutor's name] *- TT281 and TT381 now. They are well structured and you can intuitively find exactly what you want. Certain other conferences have left a lot to be desired and sometimes not very helpful :-(IM and Chat have their place in real time but think this would be only used by people who felt they know the other person or group. I would try to join in a scheduled chat session if I thought I could contribute anything useful. I would feel reluctant to IM someone I didn't know but that could be just me not wishing to be intrusive.*

Yes

3. Please add any other comments about feeling part of a community when studying a course

Historically, study has been in (usually small) groups, mostly led by a single master, guru, sage etc. That way there can later be shared opinions and argument about the subject and a clearer individual and group understanding can emerge. Focused, studying alone suits us sometimes but most need to at least occasionally compare notes with others who have been similarly focused....we are social beings.

It is essential so that ideas are shared and other approaches available to be considered.

I know you didn't ask this question but I feel that any OU study into VLE [virtual learning environment] would be incomplete if it didn't consider the OUSA [Open University Students' Association] suite of social conferences as being as crucial in supporting the 'sense of community'.

I was always a last-minute student. The ongoing participation in conferences has helped me keep up the momentum. Also, I find it very beneficial to read other students' questions because I always try to reproduce the problem or look for an answer. This helps keeps me studying and researching when I'm feeling lazy.

I chose the OU because it was distance learning, partly because I am now in a wheelchair, partly because I am often in hospital, and partly because I work better alone without distractions, so conferencing has been far from a support aid and more of a thorn in my side that has hindered my progress. I just get the time and energy to sit down and do some solid work and I have to plough through pages of messages in case I miss something I need.
To be fair I have already studied at an on campus university and was very heavily involved in student life as I was senior student at a hall of residence for three years, so I have already had the 'community experience' and have many ,and varied friends from that time. I also have a husband writing up his phD at my old university at the moment so I am still involved with other students and some of the staff. So I guess what I am trying to say is that I think the conferencing idea is great and many people either need or want that support. I just wish it wasn't forced on those of us who would be better off getting on with our work, because reading through all the threads on five different courses has meant that I have not been able to cover the subjects in the depth I would normally have and that is definitely going to be reflected in my marks. I will try to avoid subjects that have conferencing as a 'required' element in future.

Myself I've never felt the need for it but I can understand that when the going gets tough then having other people to talk to who can understand what is happening would be helpful. I just don't want to be made to do it. 'Every one's needs are different'

One thing I find annoying is the concept of a message history. I post a message, check a few days later to see that 10 people have viewed the message ... but how many have actually replied to the post ... 1, 2 ... 10? Usually 1 ... This does not foster a sense of community. Get rid of the History ...

> *I've got no other form of communication. There are no F2F sessions and if I have a problem no tutor to ring or email. I don't get feedback from the ECA, so this community is the only other way to learn when the books and study guides don't help me. I have to ask other people, or read what other people have been working with, or I cannot ever solve some problems. For instance, I never got the checkbox to work and having asked and read and asked, I've given up. I can't be bothering other people any more for this. There's a limit to the community duties and a limit to my rights to ask.*

> *I feel overwhelmed at times by the amount of messaging that has been occurring while I have been offline. A small grouping of students studying the same course would help me to glean a relationship, in the sense of community, as I would be able to identify individuals.*

> *Too many folders (areas) to try to find previous messages. Message listing would be better in descending order.*

> *It takes time to feel part of a group of real people, not computer generated answers. But it does happen, especially as you ask for and receive or give help.*

Résumés

> **4. If you looked at other people's résumés, was this helpful? If so, in what way?**

> *I did look [at] a few, it was helpful only in knowing that the system appears to work okay*

> *Yes. It was helpful to learn something about the background of other people and to see where their area of expertise lies*

> *I'm as guilty as the next for being curious and yes I would occasionally looked at other peoples résumés. As to whether résumés are helpful, I'm with [another student's name] on this one. You can tell all you need to know about a person from the messages they post and if they do not post message[s] then they can hardly be considered by me as being part of the collective sense of community.*

> *I looked at lots of résumés early on. I haven't bothered since, so it was more of an early familiarisation exercise than an ongoing resource. It was interesting in a small way, like the round of introductions at a tutorial.*

> *When this system started up I looked at the résumés of a couple of the moderators, to see what their specialist field was, and I looked up yours when you posted these questions. I wasn't sure who the [moderators] were at first and looked at a couple of résumés by mistake, but other peoples personal details don't really interest me and I like my privacy, so I was not tempted to fill one out myself. I think there is place for this service for people who want to be involved, but it should be optional and as we have signed up for distance learning we should have the right to anonymity if we so choose.*

> *I've looked at a few but I don't consider them either helpful or unhelpful.*

> *Résumés are only helpful if everyone on the course writes something, anything about themselves. Some people did, some people didn't. I think people are put off by thinking 'I don't have anything interesting to say about myself' hence they don't write anything.*

> *Helpful to place an image (or written description) of an individual against their comments. It assists in "identification" in the mind's eye.*

> *Well I posted mine but I notice that some did not. I had a quick look to see if I could recognise anyone working at the same level or with similar interests.*

> *They gave an idea of where people were coming from, what their perspectives were.*

5. How important is it for you to know something about other students on a course you are studying?

It's of minimum importance; what one might want to know - if anything - can be deduced from conference posts. Anything more is only required if you live with them or they are responsible for social decision-making.

Not that important, but it does provide context for some replies.

Not something I've ever considered before but now that I have I think that it is just as important for me to know my fellow student in a virtual sense as it is in the real world but I think we should be left to learn about each other in a more natural way over a period of time, rather than learning it from a résumé, which only tells us what the person wants us to know

It's not important to know anything other than what comes out from reading questions, answers and comments.

Not at all for me. I like to keep my studies separate from my personal life, probably because I was so heavily involved in my previous university, I (and three others) were senior students to two hundred students each year for three years and I still end up giving advice on problems that my husband's fellow students have. So keeping my distance is something I was quite keen to do this time given that my energy levels are lower.

Not particularly.

In one way it is important because you then get to know them a little better but you can't gain much from just a few lines of text and a photo.

Not at all.

It's not vital but I think it could help if everyone put something up even if it's their location, Town, County or Country even? I doesn't have to be personal details it could be just what courses you have done so far and what you hope to do in the future.

A bit.

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6. Please add any other comments about résumés in a course conferencing system.

They're okay, but résumés in general tend to be staid things that belong in the cupboards of hiring enterprises. (Though I did post one in this case study!)

Nice to have, but it should be optional as many people like to maintain their privacy and anonymity.

Burn'em I say...lol

An ice-breaker.

I am sure that for some students résumés will help them to see that there are other people that are studying in similar circumstances. There will also be people who just like to know who they talking to, maybe this would appeal to me more if I were more isolated, younger, or if I had not studied at university level before.

Neither for them nor against them.

Will our résumés be deleted at the end of this course?

Instant messaging

7. If you used the TT380 instant messaging facility ("TT380 Community"), was this helpful? If so, in what way?

I used it once, to test if it worked, as it's part of this course's case study. It was helpful to get a response and verify that it does indeed work.

I did briefly to see that it worked, but in general it was not helpful as there were too few people around when I looked - normally only one or two people.

I did not use it.

I have not used the facility.

I have not used this service as I do not know anyone on the course and would not wish to converse with a stranger. I do however use Skype to talk to friends abroad, generally with a webcam and voice over IP, its great and I can see how that would help people who felt that they were isolated. Personally I don't get enough time to speak to all the friends I want to as it is, so I would not use it for chatting to strangers unless they were colleagues collaborating on a specific subject or project which I have also done in the past.

Never used it. As [another student's name] *comments, it might be useful if you're stuck with a deadline coming up. Also,* [a different student's name]*'s comment about using it for collaboration on a specific project seems a worthwhile use. (But has it any advantage over an email?)*

No, because I hesitate to message people who are essentially strangers, merely names on a screen.

I have tried to use it once, however the other party dropped their connection at the time(!)
I feel it would be useful as a discussion tool, in an opportunistic way, however find it difficult to type quickly enough to "keep up" with my thoughts (and the other persons replies!)

Didn't get chance to use it, I'm afraid!

Not useful - no one answered when I called. No one called me.

8. Is it helpful to see that other people are online, even if you don't make contact with them?

Yes. It engenders a feeling of study going on, each of us in our booths keeping quiet in the university library sort of thing.

No. It is only helpful if you use it to contact someone.

I do not find it helpful.

Yes, in a gazing around the library kind of way.

For me not really, it has not occurred to me to look. Although it would be helpful to know when a moderator would be online so that we can ask questions that may take some explanation after the first reply. Again though for people who want company on line to start a discussion it would be useful to know if people are on line. if this is a feature though you should also be able to mask your presence so that you don't offend people who may try to engage you in a conversation when you don't have time or simply don't want to.

Essential I should think if you want to get in touch with other people, otherwise not much.

Yes - it implies that I'm not the only one following the course, or the only one who

works at that time.
Yes, I agree that it gives a sense of "library".
Yes, it's vital otherwise how would you contact them if you wanted to :-)
Yes - and seeing the times they work is interesting too. People have different patterns to their day and people like me have patterns like me.

9. Could the instant messaging facility be enhanced in any way to make it more useful to you?
I don't think so, not having used it practically. In general, of course, philosophically-speaking, everything is changing and anything might be improved because nothing is perfect.
It was not really used due to lack of numbers.
Make it optional. With the default of 'No messages, thank you'.
I never have anything to say, so I don't really need an easier way to not say it. I probably won't use instant messaging until I do a course that requires it.
Posts to say when moderators are next likely to be online so that you know when it is worth logging on again to look for an answer to a question.
The default should be to not participate. (Don't W3C guidelines say something about people having to positively opt in rather than out?)
I'm quite happy with Skype or msn for my friends and family and I like the little beep that Skype gives me when someone wants to chat.
It could possibly be made more entertaining utilising voice recognition software (!)
Can't think of anything at the moment.

10. Please add any other comments about instant messaging in a course conferencing system.
I [have] *not properly used this one and I have never used any of those generally available on the web. They depend on the sides being online and not doing much else and, with deadlines in sight (mostly the case for short courses) they are likely to be more distracting. I imagine they could be useful for those panicking and needing some other person from the group to just talk to at least.*
I believe that on a course like this, a chat room would be a useful tool, with set times when a moderator is available (on a weekly basis if possible). Students could then pop into the chatroom and ask questions, and (hopefully) get replies in real time from mods and other students. An archive of the chat should be provided so that students that could not make that slot can view the discussion. In general, I think the use of the message forum case study hindered my study on this course. The interface is poorer than First Class, and the functionality is weak. As a consequence, I did not spend much time on the forum, nor did I post many messages to it (as I have done on the previous two courses). I also feel that as a case study, it did not contribute towards my understanding of the material in the study guides.
Instant messaging is the most abominable and intrusive method of electronic communication ever invented. There is nothing worse than your train of thought being interrupted by unwanted messages popping up, sometimes obscuring the area of screen that you are working on, and which grab focus and so need to be closed before being able to continue with what you were doing. At work I disconnect the computer from the network so as to stop this happening

Useful for immediate private contact, I suppose. I find that conferencing and emails already do the job.
I am sorry if my postings sound negative, they actually aren't really. I think the concept is great and for some people will be a real lifeline, I just don't like to be forced to use it, it is very time consuming to wade through what is and isn't relevant and I don't like the fact that I have been forced to let everyone on my five courses know my name, when I chose to study on my own at home. If I had wanted to be part of a community I would have gone to a campus or studied at a local college.
I agree wholeheartedly with [another student's name]*: instant messaging systems are a curse. Their use is banned in my company. I would think twice about studying any course where its use was compulsory.*
I tried it once, but didn't get a reply so was too embarrassed at intruding.