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Networked learning in higher education: Students' expectations and experiences

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Abstract. This paper reports findings from a study of undergraduates' expectations about, and experiences of, networked learning using computer-mediated conferencing (CMC). The data come from questionnaires administered at the start and end of four different courses, and their interpretation is informed by a set of interviews with students and teachers involved in these and other networked learning courses. Students' views were generally positive at the start and at the end of each course, though they became more moderate over time. The structure of students' reported feelings remained relatively stable over time. There was no evidence to suggest that male or younger students had more positive feelings about networked learning. The thoroughness with which CMC is integrated into a networked learning course appears as a significant factor in explaining differences in students' feelings about the worth and value of their experience. As might be expected, a well-integrated course was associated with more positive experiences.

Keywords: approaches to study, computer conferencing, networked learning, student expectations, student experiences.

Introduction

There has been a substantial increase, over the last five years or so, in the use of electronic mail, the World Wide Web and computer conferencing as aids to teaching and learning in UK higher education, as well as in higher education in other technologically advanced countries (see e.g., Bonk and King 1998; Hazemi et al. 1998; McConnell 2000; Goodyear et al. 2001). A particular genre of such technologically assisted education has come to be called 'networked learning' (Steeples and Jones 2002). We define 'networked learning' as:

> learning in which information and communications technology (ICT) is used to promote *connections*: between one learner and other learners; between learners and tutors; between a learning community and its learning resources.

Some of the richest examples of networked learning involve interaction with on-line materials *and* with other people. But, in our view, use of on-line materials is not a *sufficient* characteristic to define networked learning. Human–human interaction is an essential part of networked learning. The interactions between people in networked learning environments can be synchronous, asynchronous or both. Synchronous interaction requires the interacting parties to be available at the same time (as with the telephone). Asynchronous interaction – as with fax or voicemail – allows the interacting parties more flexibility in their use of time. Email is the best-known example of ICT-enabled asynchronous interaction. Asynchronous computer-mediated conferencing (CMC), using tools such as FirstClass, WebCT or Blackboard, is fast becoming the most common kind of technology-based learning experience for undergraduate students.

The interactions in networked learning environments can, in principle, be through text, voice, graphics, video, shared workspaces or combinations of these forms. However, in mainstream UK HE practice, text is the dominant medium and much of the time that students and tutors spend in networked learning consists of composing, reading and reflecting on electronic texts, such as email messages or entries in text-based computer conferences.

Networked learning in undergraduate education in the UK is rarely – probably never – used without some kind of opportunities for face-to-face interaction. The tendency is to find ways of blending CMC with more traditional forms of activity, seeking to get the best from a mix of different methods. This is certainly true for the institutions whose courses we have focussed on in our own research. In each of the sites, students were involved in both CMC and face-to-face meetings.

Related research

Research on networked learning in UK higher education has been underway for about ten years. Early reports primarily took the form of descriptions and evaluations of innovative courses (e.g., Hartley et al. 1991; Steeples et al. 1992; Hodgson and McConnell 1992 and see also the collections by Mason and Kaye 1989; Kaye 1992). A distinctive line of research then began to open up, using the transcripts of computer conferences as data and looking – among other things – for evidence of particularly productive kinds of interaction,

for suggestions about how online tutoring might best be conducted or for guidelines about good ways of participating as a networked learning student. Methods for categorising and analysing networked learning texts have been described and exemplified by Henri (1992), Howell-Richardson and Mellar (1996), Mowrer (1996), Zhu (1998), Hara et al. (2000) and de Laat and Lally (2003). Early work in the field was often, implicitly or explicitly, oriented towards understanding why computer conferences failed to generate the levels of student involvement tutors expected. Simply put, many students failed to engage. More recently, the focus has shifted to the *kinds* of learning interaction that appear to be taking place and whether they fit with tutors' beliefs about 'good learning'. There has been a shift of attention from the quantity of contributions to the quality of learning (Booth and Hulten 2003; de Laat and Lally 2003).

A limitation of studies which restrict themselves to the analysis of transcripts is that too little is known about the circumstances in which the texts were created and about the intentions and feelings of the creators and readers of the texts (see e.g., Jones and Cawood 1998). One study which succeeded in investigating students' interpretations and evaluations of their online texts was Goodyear (1996), out of which came a number of guidelines about the conduct of successful electronic seminars. Similarly, Hardy et al. (1994) were able to combine the quantitative analysis of transcripts with interview data to cast light on gender differences in the construction of online texts.

More recently, a number of researchers have adopted ethnographic approaches, combining observation and in-depth interviews in an attempt to get closer to the students' own understandings of networked learning (see e.g., Jones 1998, 2000; Light and Light 1999; Light et al. 2000). From this, we have learned more about how students interpret the demands placed upon them and how they improvise responses to the conflicting calls on their time. In addition, ethnographic studies have allowed us to get a clearer sense of what networked learning tutors say they are trying to achieve. For example, Jones et al. (2000) carried out in-depth interviews with 17 experienced networked learning practitioners. Among other things, they identified a convergence in the practitioners' conceptions of learning, with strong emphasis being placed by many on collaborative learning: learning through articulating ideas and experience and learning through active engagement in collaborative tasks.

Research on networked learning in higher education to date leaves a number of serious gaps. (For overviews see Bonk and King 1998;

McConnell 2000; Coomey and Stephenson 2001; Banks et al. 2002). First, the vast majority of studies have been in the context of postgraduate programmes with a strong distance education component. There is still relatively little research on campus-based undergraduate programmes. Second, there are very few studies where the researcher is not one of the staff teaching the course. While insiders' perspectives can be very valuable, they necessarily provide a partial source of evidence. Third, the fact that studies often depend for their data on end-of-course evaluation questionnaires means we know very little about what students think about networked learning at or near the start of their course. Fourthly, most studies report data from a very small number of students. Finally, few studies have gathered comparative data across networked learning courses running in different universities.

To help remedy this problem, the research reported in this paper is concerned wholly with undergraduate education and with networked learning courses where we (the researchers) were not involved as teachers. Our dataset was collected from more than 250 students on four courses in four different universities and was gathered in parallel forms at the start and the end of their courses. In addition, we carried out a number of individual and focus group interviews with students and staff involved in the courses.

Research goals

The main aim of this study was to gather information about UK undergraduate students' perspectives on networked learning. Since this is a field in which we have, at the present time, only fragmentary insights into how students think about networked learning, we took a rather open and exploratory approach. Salient among our research goals was to see (a) whether there were significant differences between students' expectations about networked learning and their reports of their experience of networked learning at the end of a course, (b) whether expectations and experiences differed for different groups of students. For example, it has sometimes been argued that female students and older students are less comfortable with technology than are male students or younger students (see, e.g., Kramarae and Taylor 1993). We wanted to know whether this appears to be true in the case of networked learning at the start of the 21st century. We also wanted to know whether the extent of someone's computer experience predisposes them

to expect more from a networked learning course, or conversely whether students with only limited computer experience would be anxious about and negatively inclined towards networked learning. The same question can be asked in relation to a student's approach to study or their conception of learning. For example, Light and Light (1999) have produced tentative evidence of an association between a deep approach to learning and relatively high levels of participation in a computer conference. Some of the discussion of the virtues of networked learning assumes a mature, reflective learner with a sophisticated conception of learning (see, e.g., McConnell 2000). Such assumptions *may* be warranted in the context of postgraduate level programmes of continuing professional development, but they may not be so safe when applied to undergraduate teaching and learning. Consequently, we wanted to know if students with particular approaches to study had distinctive expectations about networked learning or distinctive feelings about their subsequent experiences of it.

Methods and data

To achieve our goals of gathering insights into the expectations and experiences of a reasonably broad range of undergraduate students we adopted a mixture of case study and survey methods. Some initial findings from the case study interviews and observations can be found in Jones and Bloxham (2001) and Jones and Asensio (2001). This paper is the first to report data from the survey-based parts of our work. While our focus is very firmly on what can be said on the basis of the survey data, we also have the advantage of being able to interpret some of the outcomes in the light of our richer case study knowledge.

The other main methodological point to make here is that this study is essentially exploratory. Exploration rather than confirmation is highly appropriate when working in relatively unknown territory. It is now very common for small-scale qualitative studies to have a strong exploratory flavour. In our experience, it is less common for exploration to make extensive use of quantitative data and methods. There are, of course, the dangers of data-dredging, resulting in spurious associations or uninterpretable differences. We believe we have achieved a sensible balance between letting our understanding of the field guide the questions we ask of our data, and letting emergent patterns in the data suggest new insights, or at least some sharper questions.

The students

The students involved in this study were enrolled on one of four courses at four different universities in the UK. The selection of universities and courses was determined by a number of factors. A primary criterion was that none of the courses should be running for the very first time. We also sought a range of different types of networked learning, but with sufficient similarities between the types for us to be confident that students were experiencing variations on a coherent kind of technology-based learning. All students were studying on undergraduate courses in an area of social science. The dataset includes part-time as well as full-time students; first, second and third year undergraduate students (but not post-graduates), and mature students as well as students straight from school. 60% of the students were female, which is not unusual for social science courses in the UK. Mean age was 27 years with a median age of 22.

The four universities vary in the strength of their research reputations and in the proportion of their income which comes from research funding sources. (They are not all 'old' or 'new'.) All the students were studying in the north of England.

The courses, and kinds of networked learning approaches, can be described as follows.

Course L (*Law*) was a first year course in Common Law. It was a compulsory element of both the LLB and LLB (European Legal Studies) degree programmes. The course covered the Law of Obligations and lasted for a full academic year. The course was taught on the university campus, using a mixture of face-to-face meetings and CMC. The software supporting the conferencing element was Lotus Notes. Significant parts of the course involved students working in groups, using the conferencing system to interact within the groups and to post materials to other groups with whom they had to conduct negotiations. Networked learning methods were not widespread within the Law department, nor were they heavily promoted by the University.

Course E (*Educational Technology*) was a third year course concerned with exploring the development of information systems for teaching and learning. The teaching site was a large city-centre campus, with the course in question being taught in a purpose-built centre that included an open-plan computer suite. The course was taught using a locally-created Web interface that gave access to learning resources and was intended to provide the main medium for teaching and learning. The Web interface included an asynchronous communication element

using a freeware CMC system. The face-to-face elements of the course, lectures and seminars, were intended to supplement or complement the main Web-based material. Networked learning was not a key feature of the University provision or that of the Department but the entire degree programme was taught using a group-based approach and this provided a basis of prior experience for the online group work.

Course T (*Technology in Society*) was taught part-time and largely at a distance. The course could be studied with no prior experience at the university hosting the course, but was a second rather than first level course. The course content, linking technology with social science subjects, was supplied in book form and on two CDs: one that contained a database of articles and another containing a number of multimedia resources. The course included a series of local face-to-face tutorials (six in total) and was supported by a Web site, television broadcasts and a computer conferencing system (FirstClass) that was a focus for core activity in two key components of the course. The core activity included group work and the production of work for submission and assessment that included both group and individual components. The University providing this course was shifting rapidly to the use of networked learning methods to supplement other forms of study.

Course S (*Study Skills*) was a first year undergraduate study skills module for social science students. The university hosting this course has a large city-centre campus split across several sites. The course was taught using a university-wide Virtual Learning Environment, (based on the CMC system FirstClass). The course required students to work together and alone, to complete a number of set tasks in the computer-supported environment. Use of the CMC system to discuss or coordinate activity was not a *requirement* on this course. The university had a comprehensive strategy for online networked learning and this first year module formed part of a university-wide process of change with respect to increased use of networked learning methods.

Data gathered

Data were collected from the students on two occasions: at the start of the course and near its end. The main data gathering instruments were two questionnaires, though we also held interviews with sub-samples of students. Students completed the questionnaires independently and knew that their responses would not be seen by their tutors. The

questionnaires were completed during normally timetabled, face-to-face class sessions. The important point to make here is that the samples achieved for each questionnaire are representative of those starting and completing the courses. They are not likely to over-represent those students who have particularly strong views to express. We also held interviews and ran focus group sessions with staff and students.

Table 1 provides an overview of the data gathered at the start (Ql) and end (Q2) of the course.

The questionnaires were collected with student names and identifiers attached. Students were informed in a letter issued with the questionnaire that data would be anonymised and that any information gathered would be held securely by the research team and used solely for research purposes. The final course assessment results were obtained for three of the courses (134 students).

Table 1. Data gathered at the start (Q1) and end (Q2) of the course

		Q1	Q2
1	Information about the kinds of networked learning technologies that the student used regularly, had ever used, expected to use at some point on their degree programme and expected to use on the course in question.	√	
2	Responses to 23, 5-point Likert items tapping students' views about the role of technology on the course they were just beginning, and again at the end (with the wording of the items changed to past tense)	√	√
3a	The 52-item version of the ASSIST Approaches to Study Inventory (Tait and Entwistle 1996; Entwistle et al. 2000)	√	
3b	The reduced 18-item version of the ASSIST ASI		√
4	Their name, student identification number, age, sex and year of study in addition to other information identifying their faculty, course, university etc.	√	√
5	Students were asked how well they thought they had been doing on their assessed work so far. They were given a 9-point scale on which to record an answer, ranging from 'very well' to 'rather badly'	√	√
6	Responses to 17, 5-point Likert items tapping students' views about their recent course experience		√
7	Eight 5-point Likert items tapping students' beliefs about learning		√

Table 2. Breakdown of dataset by university/course

Course	Course level	Q1 cases	Q2 cases	Q1 and Q2 cases
Law	Year 1	54	59	38
Ed tech	Year 3	31	35	21
Tech in soc	Years 2 and 3	77	39	29
Study skills	Year 1	85	61	31
Total		247	194	119

Table 2 gives a breakdown of the dataset by course setting. 247 students completed Questionnaire 1. 194 students completed Questionnaire 2. We have 119 cases where a student completed both questionnaires and where we can be confident in linking questionnaires at the level of the individual student, thereby allowing robust 'before and after' comparisons.

We cannot know with any certainty if those who were dissatisfied with networked learning were those who were sufficiently dissatisfied with the entire course to leave before the end of the course. However we know that only one course showed a significant drop out rate and that was the distance learning Course T. The drop out from this course was consistent with reported drop out rates for distance courses of this type and at this particular institution. The return was also affected by the reduced attendance of students at tutorials towards the end of the course and returns for Q2 were supplemented by online returns of questionnaires emailed to all students. It is possible in this case that the attrition could artificially inflate the proportion of students reporting satisfaction with networked learning. However we also know that the Courses L and E, which (as we shall see) both reported positive results, had little or no attrition and that variation in returns simply reflected attendance at face-to-face sessions at the start and end of the course. In both cases more questionnaires were returned at the end of the course (Table 2).

Results

Results of our analysis are presented in three sections. First, we offer an analysis of the pattern of *expectations* depicted in the data from Questionnaire 1. We use all 247 cases in this analysis. Second, we offer a parallel analysis of students' *experiences,* drawing on all 194 cases from

Questionnaire 2. Finally, we re-examine some of the differences and continuities between Questionnaire 1 and Questionnaire 2 by drawing on the smaller dataset (119 cases) where we can link Questionnaire 1 and Questionnaire 2 at the level of the individual student.

Students' reports of their expectations at the start of their course

The main source of data on which we draw in this section is the set of 23 Likert items presented to the students in Questionnaire 1. These items are listed, together with means and standard deviations, in the left hand part of Table 10. First, we offer a number of observations based on analysis of individual items. We then present an analysis based on responses to sets of Likert items which cohere around four themes – identified with the aid of principal components analysis.

Item 19 ('I wonder whether using the technology on this course is really worthwhile') appears most directly to capture what for many teachers and students in HE is a central issue. Is technology being introduced for its own sake? Or can it make a worthwhile difference to learning? The mean response on this item was 1.78, representing a response between 'disagree' and 'disagree somewhat', though nearer the latter than the former. In fact, 84% of the students disagreed or disagreed somewhat with this statement. 26 students (11%) registered scepticism about the use of the technology.

There is no obvious connection between this more sceptical position and either the university they are at/the course they are on, or their sex. There is a small but statistically significant age effect, with younger students being *more* likely to express scepticism. We return to this matter shortly.

We can make some interpretation of this positive attitude by looking at responses to items 17 and 18, which ask students whether they expect to learn new skills using the technology on this course and whether they expect this use of new technology to help them with their future careers. Both items receive very positive endorsement (4.43 and 4.51, respectively). Indeed, they capture almost the strongest expressions of feeling in the 23 items. 90% of the students agreed or agreed somewhat with these statements.

The most marked feeling is captured by item 1 ('Technology will be particularly important in the running of this course'). The mean response here was 4.84. None of the students disagreed with this statement and only one said they 'disagreed somewhat'. 210 (85%) of the students

gave the maximum possible rating. We interpret this to mean that the technology-oriented aspects of each course were very salient in the students' minds, especially at this early point in the course. This salience may have been reinforced by the tutors' descriptions of the distinctiveness of the learning experience on offer, as well as by early parts of the course that were meant to help prepare the students to use the technology involved. It is clear that the students are not construing the use of technology on the course as being normal or mainstream. For example, they anticipate that the way they will be expected to work, on this course, will be different from how they are expected to work on other courses (Item 2, mean score = 4.21). They expect that they will have to be more self-directed on this course (Item 6, mean score = 4.2) but they also expect that they will be able to interact more often with staff and students (Item 5, mean score = 4.05). Overall, they do not feel that the course will be 'just like other courses taught traditionally' (Item 9, mean score = 2.00).

To examine the patterning of students' expectations in more depth, we sought first to reduce the Questionnaire 1 dataset by performing a factor analysis on the 23 Likert items. Principal components analysis with Varimax rotation was chosen. Eight components with eigenvalues greater than one were extracted, explaining 64% of the variance. Examination of a scree plot, together with inspection of the loadings of the items on the eight components, suggested focussing on the first four components.

Table 3 shows the rotated component loadings for the first four components, using a cutoff loading of 0.50.

Comparing Table 3 and Table 10 suggests the following interpretation of the four components.

Table 3. Questionnaire 1 dataset (student expectations). Loading of Likert items on first four components; loadings smaller than 0.5 excluded

Component 1		Component 2		Component 3		Component 4	
Item	Load	Item	Load	Item	Load	Item	Load
11	0.624	8	0.855	17	0.808	4	0.674
13	0.605	12	0.865	18	0.820	21	0.613
15	0.577	20	−0.774			22	−0.747
16	0.715						
19	0.636						
23	0.603						

Component 1 brings together items which concern the *worth* of the use of technology on the course (Item 19), fear that technology might be a distraction from course content (Item 16), the idea that technology will be second best to traditional methods (Item 15), and a concern about missing face-to-face parts of a traditional course (Item 13) with items that capture issues about the use of time (11 and 23). One of the frequently expressed advantages of asynchronous computer conferencing is, of course, the flexibility (and responsibility) it gives students with respect to their use of time. For convenience, we label this dimension of students' expectations 'worthwhileness' but it might also be conceived of in terms of their sense of fitness-for-purpose or appropriateness of educational design.

Component 2 embraces the three items which express the student's *confidence,* or lack of it, with respect to the use of technology on the course (Items 8, 12 and 20).

Component 3 helps us to focus on the *utility* items we discussed above (Items 17 and 18), and which express hopes about learning new skills and about benefit for the student's future career.

Finally, Component 4 captures expressions of *interest* in, and excitement about, the use of technology and ways of working with others, vis-à-vis the subject matter or content of the course. We think of this dimension as representing 'intrinsic interest'. One way in which it differs from Component 1 is that it foregrounds the students' own interests and feelings whereas Component 1 might be held to reflect their rather more detached evaluation of the arrangements for the course.

We next constructed four scales on the basis of the component structure described above. For simplicity, these were constructed as the sum of the item scores listed for each component in Table 3, divided by the number of items. Since high scores on Components 2–4 reflect positive feelings and high scores on Component 1 reflect negative feelings we reversed the scores on scale 1. Finally, to improve the interpretability of the resulting scores, we transformed them so that a score of zero equates to the neutral mid-point (3) on a five point Likert scale, negative scores indicate negative feelings and positive scores indicate positive feelings, with theoretical maxima of -2 and $+2$, respectively.

Tables 4–7 show the patterning of students' expectations about their networked learning experiences, using these four scales. Tables 4 and 5 show scale scores broken down by university/course setting and sex, respectively. Tables 6 and 7 show correlations between scale scores and age, computer experience, approach to study (ASI scores) and the

Table 4. Questionnaire 1 dataset (student expectations). Scale scores by course setting

Course	C1 worth	C2 confidence	C3 utility	C4 interest
Law				
Mean	0.32	0.69	1.53	0.07
N	54	54	54	53
S.D.	0.73	1.20	0.76	1.08
Ed Tech				
Mean	0.32	1.14	1.27	0.54
N	30	31	31	30
S.D.	0.79	0.84	0.93	1.15
Tech in Soc				
Mean	0.85	1.05	1.19	1.08
N	75	77	77	76
S.D.	0.72	0.82	1.02	0.65
Study Skills				
Mean	0.60	0.14	1.75	0.29
N	80	83	85	84
S.D.	0.77	1.09	0.58	0.84
Total				
Mean	0.58	0.67	1.47	0.52
N	239	245	247	243
S.D.	0.77	1.08	0.85	0.97

Table 5. Questionnaire 1 dataset (student expectations). Scale scores by sex

Sex	C1 worth	C2 confidence	C3 utility	C4 interest
Male				
Mean	0.58	1.12	1.23	0.59
N	91	93	93	91
S.D.	0.82	0.78	1.02	1.05
Female				
Mean	0.58	0.41	1.61	0.48
N	147	150	152	150
S.D.	0.75	1.15	0.70	0.91
Total				
Mean	0.58	0.68	1.46	0.52
N	238	243	245	241
S.D.	0.77	1.08	0.85	0.97

Table 6. Questionnaire 1 dataset (student expectations). Correlations between scale scores and age and computer experience (Compexp). In the significance row, one, two and three asterisks represent p values less than 0.05, 0.01 and 0.001, respectively

	Age	Comp exp	C1 worth	C2 confidence	C3 utility	C4 interest
Age						
Pearson *r*	1	0.171	0.236	0.083	−0.202	0.304
Significance (2-tailed)		**	***		**	***
N	240	240	233	238	240	236
Compexp						
Pearson *r*	0.171	1	0.234	0.477	−0.195	0.252
Significance (2-tailed)	**		***	***	**	***
N	240	247	239	245	247	243

Table 7. Questionnaire 1 dataset (student expectations). Correlations between the scale scores and ASI scores and self-evaluation of assessment results. In the significance row, one, two and three asterisks represent p values less than 0.05, 0.01 and 0.001, respectively

	DA	SA	SAA	Self-eval
1 Worthwhileness				
Pearson *r*	0.173	0.089	−0.454	0.076
Sig. (2-tailed)	**		***	.
N	228	223	210	187
2 Confidence				
Pearson *r*	0.086	0.084	−0.165	0.277
Sig. (2-tailed)			*	***
N	231	226	211	190
3 Utility				
Pearson *r*	0.236	0.196	−0.015	−0.155
Sig. (2-tailed)	***	**		*
N	233	227	213	191
4 Intrinsic Interest				
Pearson *r*	0.181	0.097	−0.084	0.004
Sig. (2-tailed)	**			
N	231	224	211	187

student's self-evaluation of how well they thought they were doing in their assessed work to date.

Some of the apparent differences between means in Table 4 may be due to random factors. An appropriate way of screening out such differences is to use a post-hoc multiple comparisons one-way analysis of variance (ANOVA). An appropriate test for significance of differences between the means, which does not assume equal variances in the subsets of data, is Tamhane's T2. In relation to the data in Table 4, this draws attention to statistically significant differences between the means as follows.

There is a significant difference in perceived 'worth' (C1) between the Technology in Society students and those from the Law and Ed Tech courses ($p < 0.01$ and $p < 0.05$, respectively). The Technology in Society students had the strongest positive expectations here while Law and Ed Tech had less positive expectations. (Remember that these are relative. The mean scores for all four groups show feelings that are on the positive side of neutral.)

In relation to confidence about handling the technology (C2), there are significant differences between the Study Skills course and the other three courses ($p < 0.01$ in comparison with Ed Tech and Technology in Society; $p < 0.05$ in comparison with Law). The other differences are not statistically significant. This indicates that students on the Study Skills course were notably less confident about their readiness to use the technology than were their peers in the other three sites.

With respect to expectations about utility (C3), there is a significant difference between the Study Skills and the Technology in Society students ($p < 0.01$) but not between any of the other groups. Thus we can say that another difference between the technology in Society students and the Study Skills students is that the latter had higher expectations about learning new skills and about the value of those skills in subsequent careers.

Finally, on C4 (intrinsic interest), the Technology in Society students stand out as having stronger interest in the technology being used than do the Law or Study Skills students ($p < 0.01$). The Ed Tech students may well occupy an intermediate position, but the significance tests do not allow us to say so with confidence.

Overall, the picture is one in which the Technology in Society students have more positive beliefs about the appropriateness of the use of networked learning technology and a relatively strong interest in, and excitement about, the use of technology on their course. The Law students are at the opposite end of the spectrum on both counts, though

their views are still on the positive side of neutral. The Study Skills students stand out as the least confident with respect to the use of networked learning technology, but they are also the group with highest expectations about the utility of the experience.

It is possible to interpret some of the patterns in this data by reference to two variables – the topic of the course and the spatial arrangements for learning. Two of the courses, Ed Tech and Technology in Society, were (in part) concerned with new technology and may have recruited different types of student from those on the Law and Study Skills courses. Moreover, the Technology in Society students worked mainly at a distance, with more limited opportunities for face-to-face meeting. In contrast, the Law course involved students who mainly lived and worked on campus; the Ed Tech and Study Skills students lived off-campus, but could more easily meet face-to-face than could the Technology in Society students. Moreover, the Ed Tech students had use of a purpose-built centre that contained teaching rooms and a large open plan computer suite. The *combination* of topic (technology-interest) and need (infrequency of face-to-face meetings) may help explain why the Technology in Society students show the most positive feelings about the 'worth' of networked learning and declare a strong intrinsic interest in it; why the Ed Tech students show high on 'interest' but lower on 'worth' (they had a purpose built space) and why the Law students show low on 'interest' and 'worth' and the Study Skills students show low on 'interest'.

A simple ANOVA test shows significant differences between males and females on scales 2 and 3 but not on 1 and 4 ($p < 0.01$). Female students declare less confidence than males with respect to their impending use of networked learning technologies but they also believe more strongly than their male colleagues that they will find the experience more useful. There are no significant differences between male and female students when it comes to their beliefs about the worth of networked learning or their level of intrinsic interest in the approach being taken.

Turning to Table 6, we see that for three of the four scales there are significant correlations with age. Older students are more positive about the worth of the networked learning approach and claim a higher level of intrinsic interest in the approach. Conversely, younger students feel they have more to gain, with respect to new skills and future career. There is not a significant correlation between age and expressions of confidence about ability to cope with the technology.

All the students were asked about their experience with email, WWW and computer conferencing technologies. We calculated an index of computer experience from their responses. Students who claimed to be regular users (more than twice a week on average) of email, the WWW and computer conferencing scored 3 points, with one point being deducted for each technology which was not regularly used. 85% of the students were regular users of email and 79% regular users of the WWW. Only 5% of the students had never used these technologies. The figure drops considerably for computer conferencing – only 38% of students claimed to be regular users.

Table 6 shows significant correlations between computer experience and scores on the four scales. Not surprisingly, there is a strong correlation between the index of computer experience and confidence about use of the technology $r = 0.467$; $p < 0.01$). The fact that there are correlations with all four variables makes prior computer experience an important factor conditioning students' expectations about their networked learning courses.

Questionnaire 1 also included the 52-item version of the ASSIST Approaches to Study Inventory (Tait and Entwistle 1996; Entwistle et al. 2000). We used this to calculate scores for all the students, locating them in terms of three dimensions – Deep Approach, Strategic Approach and Surface/Apathetic Approach. These are labelled DA, SA and SAA, respectively, in Table 7. As might be expected, there are significant positive correlations between a Deep Approach to study and 'worth', 'utility' and 'interest' ($p < 0.01$). In contrast, the only correlation between a Strategic Approach and the four scales is with 'utility' ($p < 0.01$) – which we would expect to be salient in the minds of 'strategic' students. The 'Surface/Apathetic' approach correlates negatively with 'confidence' (and is the only approach to correlate with confidence). It also has a strong negative correlation with beliefs about the worth of the impending networked learning experience.

We would also argue that this pattern of correlation with a well-established research instrument such as the ASI gives further support to the value of our own measures and to the quality of the data in this study. Although ASI scores have been studied among distance learning students (e.g., Richardson 2000), to the best of our knowledge, ours is the first large-scale study to use them in the context of networked learning.

The final column of Table 7 draws on the students' responses to a question about how well they thought they had been doing on their assessed work so far. (A high score denotes good progress.) We take it

as a self-evaluation of academic performance. There is a small but significant correlation between this self-evaluation score and the score on the 'confidence' scale. However, there is not a significant relationship between this self-evaluation score and feelings about the worth of, or intrinsic interest in, networked learning.

To summarise what the data tell us about student expectations, it is clear that students' views are firmly positive and that they expect to learn valuable new skills from the networked learning course on which they are embarking. They see the course as very different from their 'normal' courses. When we look at students' judgements about the *worth* of the networked learning approach, we find some variations in expectations between the settings, which may in part be accounted for by the nature of the subject being studied and the students' self-image (that is, whether they saw themselves as distance learners and/or particularly interested in technology as a subject area). Older students are more positive than younger students, in relation to the perceived worth of networked learning, but there are no significant differences between males and females. There is a significant positive correlation between computer experience and perceptions of worth. Those with more computer experience express more confidence in the value of the networked learning approach. Similarly there is a significant positive correlation between perceptions of worth and a deep approach to learning and a significant negative correlation between perceptions of worth and a surface/apathetic approach to learning, as measured by the 52-item ASSIST inventory.

To give a clearer flavour of some students' thoughts on these matters, we reproduce quotations from two of the student interviews. These were conducted on a one-on-one basis, early in the students' experience of the course. The first student (from the Law course) is talking about how they would advise others about taking part in a networked learning course such as this.

> Student: 'Um organise yourself probably. Get yourself organised. I'm not a hugely organised person um and the a thing about working on your own is that you've got to be pretty organised you've got to get your information in early so you've got a strong base to work from, which is something that I had to pick up through the year. The advantage of the course is that it forces you to be organised, it's a bit sort of sink or swim perhaps but it's a skill you do learn. Apart from that go for it it's good fun … there are some students that don't suit because it is very self reliant and

> they seem to prefer a more sort of traditional University sort of course where you have more regular/frequent lectures and more sort of face to face tutor contact more often but I don't know if that's the style of course they enjoy this probably isn't a brilliant course but if they're interested in just doing something new and not having to go for lectures all the bloody time and having to work off their own back, get their own stuff and things, it's a lot more enjoyable than certainly the 101 course.'

The second student (from the Ed Tech course) also foregrounds the need for self-discipline and self-organisation skills, starting out by referring to the expectations and experiences of 'mainstream' students:

> Student: ' … it's a different style of learning than they are used to, which is quite radically different really from a standard style course'
>
> Interviewer: 'Can you just explain how it's radically different?'
>
> Student: 'Erm very much more emphasis on self discipline and self motivation. There is nobody there to by [sic] the usual things encouragement erm enthusiasm, facial expression, threats, whatever to motivate you into doing something if you're feeling a bit off, a bit tired whatever and you know you've got an hour or an hour and a half to put in on the Website it's really easy to say ''oh I'll leave it to tomorrow'' um so therefore you've got to get over that problem, you've got to set yourself the fact that if you've set yourself the time, an hour a week, two hours a week an hour and a half a week whatever to do it you've got to sit down and say ''this is the time I've set myself, the fact that I've got a cold, the fact that I'm not feeling well, the fact that I was on the beer last night has got nothing to do with it, I've got to do this, because if I don't do it now I've lost that time that I've allotted myself'' and there's other things we've got other modules, dissertations and this that and the other'.

We now turn to the data representing students' views at the end of courses.

Students' reports of their experiences at the end of their course

Near the end of each course, students were asked to complete the second questionnaire. In this section we review what they reported about their

experiences of the course. While some of our description implicitly invokes comparison with their reports of expectations, we will reserve explicit comparison for the next section of the paper. The sample achieved for Questionnaire 2 only partially overlaps with the sample for Questionnaire 1 and in particular there were reductions in the samples achieved for both the Technology in Society and Study Skills courses. Consequently in this section we report *some* key results on a course by course basis. In the next section, we compare expectations (Ql) and experiences (Q2) by drawing on a reduced data set – that which includes only the students for whom we have both Ql and Q2 data. It is in this third section that we also make 'before and after' comparisons on the two sets of 23 Likert items which were presented to the students in both the questionnaires.

Questionnaire 2 asked students to respond to a set of 17 *new* Likert statements intended to tap aspects of their experiences and perceptions of the course and its use of technology in particular. These are reproduced as Table 11. (Note, these 17 items are labelled Q2.1–Q2.17 to distinguish them from the set of 23 Likert items we introduced early, which we label simply Items 1–23.) The overall impression given by the data in Table 11 is of students who remain positive about their experiences. For example, 80% of the students agreed or agreed somewhat with the statements: 'I enjoy working with the technology on this course' (Item Q2.1, mean = 4.08); 'I think the technology is helping me learn' (Item Q2.2, mean = 4.05); and 'I feel I have learned from the contributions of other students on the course' (Item Q2.14, mean = 3.98). These items show the strongest positive feelings, but all 17 of the items have means which reflect feelings on the positive side of neutral (3). That said, it is noteworthy that Item Q2.16 ('I would like to take another course taught using technology like this') gets one of the most lukewarm responses (mean = 3.17; only 45% of the students responding in the positive). Given the otherwise strongly positive reports, we might speculate that students are saying that they valued experiencing this innovative approach but that there are other kinds of experience they would also like to have.

However the patterns in the total data conceal some interesting differences between the four course groups. For example, on Item Q2.16 ('I would like to take another course taught using technology like this'), only 13% of the Study Skills students said they would, compared with 80% of the Technology in Society students. 62% of the Study Skills students gave positive responses to Item Q2.2 ('I think the technology is

helping me learn'), compared with 80–90% of the students on the other three courses.

To examine the pattern of differences in experience in any greater depth, it makes sense to reduce the data, as we did for the first survey, by applying factor analysis to the set of 17 Likert items. As before, we used principal components analysis with Varimax rotation. Four components with eigenvalues greater than one were extracted. These explained 57% of the variance. The first two components (C1 and C2) explained 30% and 11% of the variance respectively. Examining the scree plot and the items loading strongly on each component suggested focussing on just these first two components, though C4 (6.5% of the variance) has some potentially interesting loadings on items to do with isolation (Items Q2.4 and Q2.12).

Component 1 brings together the main items which touch upon the students' overall feelings about their experience of using networked learning technology on their course – whether they enjoyed using the technology (Item Q2.1), whether they felt it helped them to learn (Item Q2.2), study more effectively (Item Q2.8) and achieve their personal goals (Item Q2.6), whether it increased their control over when and where they worked (Item Q2.7), whether they would like to do another course of this kind (Item Q2.16) and whether they would be happier doing the course without the technology (Item Q2.17 – which loads negatively).

Component 2 brings in communication and interaction with the tutor. It relates to quality of feedback from staff (Item Q2.9), timeliness of feedback (Item Q2.10) and whether there is a sense of the tutor keeping track of what students are doing (Item Q2.3).

Table 8. Questionnaire 2 (students' experiences). Loading of 17 new Likert items on first two components; loadings smaller than 0.5 excluded

Component 1		Component 2	
Item	Load	Item	Load
Q2.1	0.648	Q2.3	0.780
Q2.2	0.790	Q2.9	0.722
Q2.6	0.770	Q2.10	0.801
Q2.7	0.690		
Q2.8	0.773		
Q2.16	0.689		
Q2.17	−0.583		

We examined responses related to these first two components by constructing scales, summing the items listed in Table 8 to create a scale score for each. (Score on Item Q2.17 was, of course, reversed.) The scale scores were adjusted, as we did with Questionnaire 1, so that a score of zero mapped onto a Likert 'neutral' position, negative scores (maximum, −2) mapped onto negative feelings and positive scores (maximum, +2) mapped onto positive feelings. We labelled these scales, 'Global feelings about networked learning technology' and 'Tutor interaction'.

Looking first at differences between the four settings in relation to global feelings about networked learning we find means ranging from 1.14 for the Technology in Society course to 0.77 (Ed Tech), 0.76 (Law) and down to 0.23 for the Study Skills course. The differences between the first three means are not statistically significant but the Study Skills course score is significantly lower than the other three ($p < 0.01$). Even though the Study Skills course score remains on the positive side of neutral, it is clear that the Study Skills students ended their course with many more doubts about networked learning than did their peers at the other three sites.

The pattern is different for male and female students. Looking across all four courses, the mean for males is 0.84, that for females only 0.56 ($p < 0.05$). Controlling for sex, there are no significant differences between the scores at the four sites when we look at the experiences of male students. In contrast female students on the Study Skills course felt significantly less positive about networked learning than did female students on the Technology in Society course ($p < 0.01$).

There is a modest positive correlation between age and feelings about networked learning ($r = 0.23$; $p < 0.01$): older students tend to have more positive feelings. However, this relationship too is different for male and female students. The correlation between age and global feelings about networked learning is only 0.10 ($p = 0.4$) for males but 0.29 ($p < 0.01$) for females. The implication is that younger female students have the least positive feelings about networked learning.

Turning to the second component ('tutor interaction') we observe a somewhat different pattern of reported experience. The means for the four settings were all positive (Technology in Society 1.30, Law 1.14, Study Skills 0.34, Ed Tech 0.14). Differences between Technology in Society and Law and between Ed Tech and Study Skills are not significant. The other differences *are* significant ($p < 0.01$). That is, the students on the Technology in Society and Law courses had significantly

more positive feelings in relation to their interaction with the tutor than did students on the Ed Tech and Study Skills courses.

There is not a significant difference between male and female students in relation to this 'tutor interaction' scale (means are 0.75 and 0.72, respectively). There *is* a positive correlation between age and 'tutor interaction' scale scores ($r = 0.22$; $p < 0.01$) but as with the first component, this correlation drops to insignificance for males ($r = 0.15$; $p = 0.19$) while staying significant for females ($r = 0.29$; $p < 0.01$).

Part of the explanation for the inter-course differences may well be the degree of integration of computer conferencing into the course. The Technology in Society and Law courses were built around the idea of students using conferencing software to communicate and cooperate in groups to undertake assessed work. The students on the Ed Tech course had a conferencing system available and it had been envisaged by the teaching staff that the students would use this as a support for their group work. As it turned out, the system was slow and cumbersome to use. It was not as integrated into group work and assessment tasks as was the case on the Technology in Society and Law. The students on the Study Skills course, similarly, had access to a conferencing system, but it proved to be rather more marginal to the course.

Global feelings about the course experience mirror the distribution of computer conferencing facilities and their integration in the course unit. The Study Skills students were significantly less positive than the other three sets of students, following their experience of the course, and they were the only students who did not have a conferencing facility firmly embedded in the structure of the course. The pattern is similar in relation to tutor interaction, with the divide falling between those courses where the tutors were supporting an integrated use of conferencing systems (Law and Technology in Society) and those where the conferencing system proved to be inefficient to use (Ed Tech) or ancillary to the course (Study Skills).

The significance of interaction with the tutor as a correlate of students' reports of satisfaction with online learning experiences has been commented on by Swan (2001). Swan's dataset is restricted to students of a single US university, but she reports a correlation of 0.76 between the amount of interaction students felt they had with their tutors and their expressions of satisfaction about their experience as a whole (Swan 2001, p. 322).

Questionnaire 2 also gave us a chance to check the stability of the factor structure for the repeated set of 23 Likert items. As with Questionnaire 1, we conducted a principal components analysis with

Varimax rotation. The solution was very similar to that we achieved from the Questionnaire 1 data, with seven components (rather than eight) having eigenvalues greater than one. These seven components explained 63% of the variance compared with eight components explaining 64% of the variance in Questionnaire 1). Using the same cutoff loading of 0.5, the pattern of loadings of items on components was also very similar. The loadings on Component 2 (confidence in the use of technology) were the same and those on Component 1 were almost identical (Item 14 added, Item 23 dropped). This gives a cleaner structure to Component 1, which we continue to think of in terms of perceptions of the worth and appropriateness of networked learning. The main difference between the results of the factor analyses of the Questionnaire 1 and Questionnaire 2 data is that Components 3 and 4 collapse into a single component in the Questionnaire 2 analysis. The new Component 3, in the Questionnaire 2 data, has loadings on Items 17 and 18 (old Component 3–'utility') as well as on Items 21 and 22 (old Component 4–'intrinsic interest'). Thus new Component 3 combines feelings of utility and intrinsic interest.

This stability and modest simplification of the component structure allows us to approach some 'before and after' comparisons of these 23 Likert items with increased confidence in their reliability. This is the subject of the next Section.

Comparing expectations and experiences

A particularly valuable subset of our data consists of 119 cases where we can link Questionnaires 1 and 2 at the level of the individual student. This provides a good opportunity to look at change between expectations, at the start of the course, and feelings about experiences, at the end of the course. We used the set of 23 Likert items, reproduced in Table 10, on both questionnaires. The items were presented in the same order on each questionnaire. Those on Questionnaire 1 were worded exactly as in Table 10. On Questionnaire 2, they were changed into the past tense.

The start of course and end of course mean values, and the difference between them (Q2 minus Q1), for each of the 23 Likert items for this reduced data set can be found in the final three columns of Table 10.

Table 9 shows the items where there is a statistically significant difference between their mean ratings at the start and end of the course (using a paired-samples t-test and a cut-off point of $p = 0.05$).

Table 9. Combined Q1 and Q2 dataset. Change in ratings between the start and end of the course

		Q1 mean	Q2 mean	Change Q1–Q2
Item 1	Technology will be particularly important in the running of this course	4.85	4.34	−0.50
Item 3	This course will concentrate on the subject content, on what I have to learn	4.19	3.66	−0.54
Item 5	I think I will be able to interact more often with teaching staff and students on this course	4.15	3.61	−0.56
Item 6	As a student I will need to be more self-directed on this course	4.13	3.65	−0.48
Item 8	The technology will be easy for me to use	3.76	4.27	0.52
Item 11	The technology will not suit the way I manage my time	2.12	2.56	0.43
Item 17	I think I will learn new skills using the technology on this course	4.46	3.82	−0.68
Item 18	Using the technology on the course might help me in my future career	4.58	4.24	−0.33
Item 19	I wonder whether using the technology on this course is really worthwhile	1.71	2.41	0.69
Item 20	I will need more help on this course because of the technology	2.53	2.10	−0.43
Item 21	I am excited about using the technology on this course	3.77	2.99	−0.81
Item 23	I think using this technology will require more time than I can afford	2.19	2.68	0.47

Note: Figures have been rounded to two decimal places and include some rounding error. Wording used is from Questionnaire 1. Item wordings were changed to past tense in Questionnaire 2. $p < 0.01$ in all cases.

Table 10. 23 Likert items presented in questionnaire 1 (Q1) and questionnaire 2 (Q2)

		Q1			Q1–Q2 (n = 119)		
		n	Mean	SD	Mean1	Mean2	Diff
1	Technology will be particularly important in the running of this course	246	4.84	0.408	4.85	4.34	−0.50
2	The way I am expected to work on this course will be different to my other courses	241	4.21	1.045	4.32	4.30	−0.01
3	This course will concentrate on the subject content, on what I have to learn	243	4.19	0.921	4.19	3.66	−0.54
4	The way I work with others and the technology will be more important on this course than the subject content	245	3.15	1.237	3.19	2.98	−0.19
5	I think I will be able to interact more often with teaching staff and students on this course	246	4.05	1.029	4.15	3.61	−0.56
6	As a student I will need to be more self-directed on this course	246	4.20	1.037	4.13	3.65	−0.48
7	In this course the staff will give us detailed instructions on what to do and how to do it	244	3.38	1.189	3.40	3.16	−0.24
8	The technology will be easy for me to use	247	3.69	1.153	3.76	4.27	0.52
9	This course will be just like other courses taught traditionally	245	2.00	1.058	1.97	1.79	−0.18
10	I expect to spend about the same amount of time on this course as any other	240	2.87	1.403	2.91	2.61	−0.30
11	The technology will not suit the way I manage my time	244	2.15	1.101	2.12	2.56	0.43
12	I am confident about using the technology on this course	245	3.96	1.212	4.13	4.21	0.09
13	I will miss the more face to face parts of a traditional course	246	3.20	1.292	3.35	3.30	−0.03

Table 10. Continued

		Q1			Q1–Q2 (n = 119)		
		n	Mean	SD	Mean1	Mean2	Diff
14	Using the technology on this course will suit the way I do my work	246	3.77	1.084	3.62	3.52	−0.09
15	I think using technology will be second best to traditional methods	247	2.74	1.297	2.86	2.84	−0.02
16	I fear that the technology will distract me from the course content	246	2.35	1.215	2.30	2.60	0.28
17	I think I will learn new skills using the technology on this course	247	4.43	0.963	4.46	3.82	−0.68
18	Using the technology on the course might help me in my future career	247	4.51	0.971	4.58	4.24	−0.33
19	I wonder whether using the technology on this course is really worthwhile	245	1.78	1.083	1.71	2.41	0.69
20	I will need more help on this course because of the technology	247	2.66	1.417	2.53	2.10	−0.43
21	I am excited about using the technology on this course	247	3.74	1.219	3.77	2.99	−0.81
22	I'm not really interested in technology, I'm doing the course for other reasons	245	2.35	1.468	2.42	2.31	−0.13
23	I think using this technology will require more time than I can afford	246	2.24	1.176	2.19	2.68	0.47

Scale: 5 = Agree, 4 = Agree somewhat, 3 = Unsure, 2 = Disagree somewhat, 1 = Disagree.
Columns under the Q1 heading give the number of cases, mean and standard deviation for each item, for the start of course questionnaire. Columns under the Q1–Q2 heading provide data for the 119 cases where we have both start and end of course questionnaire date linked at the level of the individual student. Mean1 and Mean2 are he mean responses for this dataset on the start and end of course questionnaires, respectively. Diff is Mean2-Mean1 and shows change over time. Question wording is from Q1. The wording was identical in Q2 except for changes to the tense of the verbs. The table includes some rounding errors.

Several observations can be made about the data in Table 9. The most noticeable trend is for a softening of opinions between the start and end of the course. On ten of the twelve items in the table, the mean

Table 11. 17 Likert items from Q2 with means and SDs. 5 = Agree, 4 = Agree somewhat, 3 = Unsure, 2 = Disagree somewhat, 1 = Disagree

		N	Mean	S.D.
Q2.1	I enjoy working with the technology on this course	194	4.08	1.028
Q2.2	I think the technology is helping me learn	194	4.05	0.991
Q2.3	I feel the tutor is keeping track of what we are doing on the course	194	3.72	1.257
Q2.4	I think we are left to get on with our work by ourselves	192	4.26	0.852
Q2.5	I feel the tutor intervenes too much during the course	193	1.79	0.849
Q2.6	I believe the technology is helping me to achieve my personal aims on the course	193	3.60	1.042
Q2.7	I feel the technology increases my control of when and where I work	192	3.48	1.249
Q2.8	I think I am able to study more effectively using the technology	193	3.59	1.091
Q2.9	I like the feedback on my work I receive from the staff	194	3.75	1.092
Q2.10	I feel that I can ask questions and get a fast response on this course	194	3.75	1.068
Q2.11	I find the technology makes it hard to keep up with everything we are doing	193	2.51	1.164
Q2.12	I feel isolated working on this course	191	2.27	1.177
Q2.13	I find I am working with others more easily using this technology	193	3.35	1.122
Q2.14	I feel I have learnt from the contributions of other students on the course	194	3.98	1.020
Q2.15	The technology makes it difficult for me to know what I am expected to do	194	2.45	1.234
Q2.16	I would like to take another course taught using technology like this	194	3.17	1.310
Q2.17	I feel I would be happier doing this course without the technology	192	2.40	1.286
Valid *N* (listwise)		182		

shifted *towards* the neutral value of 3.00. The two exceptions are items 8 and 20. These are the two items which relate strongly to the students' sense of technical competence. (They are two of the three items which loaded strongly on Component Two: the 'technical confidence' component.) In the case of both these items, the value moved *away* from 3.00. That is, students, in general, became more positive about their technical competence. However, this was also accompanied by a substantial drop in item 17: more students, at the start of the course, thought they would acquire new skills than thought, at the end of the course, that they *had* acquired new skills.

The largest shift in the set was on item 21, which dropped from 3.77 to 2.99. At the start of the course, 88 of the students (75%) were prepared to agree ($n = 38$) or agree somewhat ($n = 50$) with the statement 'I am excited about using the technology on this course'. At the end of the course, when the statement presented was 'I was excited by the technology on this course', only 53 students (45%) said they agreed ($n = 13$) or agreed somewhat ($n = 40$).

One interpretation of this data is that students assimilated networked learning into their sense of the normal range of educational arrangements and learning experiences. At the start of the course, networked learning was presented to them as something unusual and they were interested in it, somewhat excited by it, and prepared to see what it had to offer. By the end of the course, interest and excitement had lessened, the unfamiliar had become familiar and anxieties about technical competence, acknowledged by a few, had dwindled.

This has to be read against a generally positive evaluation of the students' networked learning experiences. As we pointed out earlier, in our presentation of results from the whole Questionnaire 2 sample, students at the end of the course felt positive about what had happened. Within the smaller Q1 and Q2 sample, 83% agreed or agreed somewhat with the statement 'I enjoy working with the technology on this course'. 80% agreed or agreed somewhat with the statement 'I think the technology is helping me learn'.

Of course, the nature of the instrumentation used here pushes students towards a simplified summative expression of what may be quite complex and unresolved feelings. For example, one Law student, in interview, was clearly struggling to sum up the trade-offs between deep engagement and strategic use of time.

> Interviewer: If I was a student coming on this course or planning to do this course next year, what would you say?

> Student: I'd say it's really interesting, because it's satisfying you can find it addictive um it's complicated the first few times you go onto it but once you've got the grasp you're going to be on it forever, you're going to be on it for so long it's going to really waste your time, so don't come.

The second main part of our analysis of differences between expectations and experience uses change in the 'worth' scale we constructed, described and tested with both the Questionnaire 1 and Questionnaire 2 datasets. Within the joint Q1 and Q2 dataset ($n = 119$) we calculated scores on this 'worth' scale for the start of course and end of course and began to look at the pattern of outcomes where feelings about the worth of networked learning increased markedly or decreased markedly. In the sample as a whole, the mean 'worth' score fell from 0.51 at the start of the course to 0.30 at the end of the course. Using a paired samples *t*-test, this difference is significant ($p < 0.01$), showing that although the overall sense of worth remained on the positive side of neutral, it also fell significantly from the start to the end of the courses.

We calculated the decrease in the sense of worth (of networked learning) for all students in this Q1 and Q2 dataset. There were no significant differences between the four course settings or between males and females. There was no correlation between age or prior computer experience and change in the sense of worth. Turning to correlations with Approaches to Study, there were no correlations between change in sense of worth and Deep or Surface/Apathetic Approaches but there was a small, positive correlation between Strategic Approach and change in sense of worth ($r = 0.25$; $p < 0.01$). That is, students identified as taking a Strategic approach to study, at the start of the course, showed an *increase* in their sense of the worth of networked learning.

We obtained students' end of course grades for three of the four sites. Students did not know their grades at the time they completed the second questionnaire. There were no significant or consistent correlations between grade and change in sense of worth either for the pooled data set (across the three settings) or looking within each university setting. Finally we looked at students' responses to the question about how well they thought they were doing on their assessed work overall. This was asked at the start of the course and at the end, using a nine point scale. Both these self-evaluation measures (start of course and end of course) correlated positively with change in

sense of worth of the networked learning approach. That is, students with a positive sense of how well they were doing in their assessed work showed an increase in their sense of the worth of networked learning ($r = 0.33$, $p < 0.01$ for the start of course self-evaluation and $r = 0.31$, $p < 0.01$ for the end of course self-evaluation). Incidentally, although there was not a significant correlation between end of course grade and change in the 'worth' score, there were significant positive correlations between the students' self-evaluations and the grades they were awarded. This suggests that their self-evaluations were not unrealistic.

Conclusions

We set out, in this research work, to see whether there were significant differences between students' expectations about networked learning, at the start of a course, and what they had to say about their experience of networked learning, at the end of a course. We also wanted to see whether there were significant differences in expectations or experiences between different groups of students. We analysed data from some 250 undergraduate students taking one of four courses, set in the social sciences, in four different English universities, to obtain some answers to these questions. Each of the courses made use of networked learning. Our primary data sources were start of course and end of course questionnaires, tapping expectations and reports of experience respectively. These questionnaires used sets of Likert items to gather 'broad and thin' data. However, we also carried out a number of observational and interview-based case studies, which help interpret and add depth to the broad-based survey data.

The underlying dimensions of students' thoughts about networked learning did not change radically between the start and the end of the course. At the start of the course, it was possible to distinguish four main dimensions underlying the students' responses. These were concerned with (i) thoughts about whether the use of the networked learning approach and technology was appropriate and worthwhile, (ii) confidence about the use of networked learning technology, (iii) expectations about the utility of the experience of using networked learning technology (gaining useful new skills), and (iv) expressions of intrinsic interest and excitement about the use of networked learning technology. These same dimensions were still evident at the end of the course, though dimensions three and four collapsed into a single

dimension. Within this relatively stable structure of expectations and reported experience, students' views did change from the start to the end of the course. The most notable trend was for students' views to moderate with time. Feelings remained positive–often strongly positive – but they were noticeably less positive at the end of the course.

Turning now to the examination of differences in expectations between groups of students, we found no significant differences between male and female students. We did find more positive expectations among older students and among students with more experience of relevant technologies. We also found significant correlations between expectations about the worth of networked learning and approaches to study, as measured by the 52-item ASSIST inventory. There was a positive correlation with a Deep approach to study and a negative correlation with a Surface/Apathetic approach to study. There was no such correlation with a Strategic Approach to study.

When we came to look at changes in the students' feelings about the worth of networked learning, between the start and the end of the course, we found a small but significant decrease in sense of worth over time, though views remained positive. When looking at this change in the sense of worth, we found no significant differences between our four settings or between male and female students. Nor did we find significant correlations between change in sense of worth (on the one hand) and age or prior technological experience or end of course grade (on the other). There was some evidence to suggest that students whose self-evaluations of their academic progress were more positive than the average also remained relatively more positive about the worth of networked learning. The same appears to be true of students adopting a Strategic approach to study.

One interpretation of the decrease in the reported sense of the worth of networked learning, between the start and the end of the course, is that students moved from a situation in which they were excited about participating in an unfamiliar and innovative kind of learning situation to one in which they had assimilated the innovation and come to regard it as part of mainstream experience. It is worth restating the point that their opinions remained positive.

This paper is, to the best of our knowledge, the first to report on undergraduate students' expectations about, and experiences of, networked learning, using a broad-based sample. It is useful in showing that, by and large, these undergraduate students had positive feelings about networked learning. It is also useful in showing that there are no

good reasons to suspect that networked learning is disproportionately attractive to young or male students.

If this seems contrary to expectations, it may be because some common assumptions about technology and its use and users need challenging, As one student put it:

> I find it much more personal, much more informal than a hundred people sat in a lecture hall listening to someone, it's more sort of down on a more human level and I felt very much like it's an adult way of learning rather than sitting listening to your teacher in front of the class. That way I think it is a big culture shock to a lot of people sort of going through three and a half years of being taught the same way as you were in primary school and then somebody comes along and says you can learn the way you want to learn, which is I think a lot of the problems and that's why there is so much resentment against on-line learning and having to learn from whatever a computer because if you look at people who are motivated then I think you can find out more and actually learn and adapt more into your understanding from somebody else's thoughts which are up there on a screen.

A number of questions require further investigation. First, our sample was restricted to social science students. While networked learning is not much used in the sciences (Goodyear et al. 2001) it is of strong interest in some of the arts and humanities and it would be worthwhile to extend this kind of research to some undergraduate courses in those areas Secondly, it would be valuable to draw data from more courses in which use of computer conferencing is properly integrated into the rest of the students' educational experience, and in which there is a clearer sense of the purpose for the computer conferencing activity. For example, there may be interesting differences between situations where the conferencing system is used to promote academic discussion (the 'electronic seminar' model) and where it is used to help students co-ordinate their work on other kinds of group task, such as the shared creation of an artefact of some kind (the 'virtual groupwork' model). Finally, we need to find ways to link the kinds of quantitative evidence generated here, with evidence from conference transcripts and with evidence gathered from interviews with students and staff. Some good examples exist of research which uses summaries of quantitative evidence as a stimulus in discussions with networked learning tutors (e.g., de Laat and Lally 2003). More of this kind of triangulation work needs to be done before we can claim to have a rounded picture of networked learning in higher education.

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