

# **Advances in Research on Networked Learning**

*Edited by*  
**Peter Goodyear  
Sheena Banks  
Vivien Hodgson  
and  
David McConnell**

# **Advances in Research on Networked Learning**

# COMPUTER-SUPPORTED COLLABORATIVE LEARNING

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## VOLUME 4

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# **Advances in Research on Networked Learning**

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## Chapter 1

### Research on networked learning: An overview

PETER GOODYEAR, SHEENA BANKS, VIVIEN HODGSON &  
DAVID McCONNELL

#### Introduction

In this chapter we offer an overview of recent advances in research on networked learning, using the studies reported in the main chapters of the book as our primary source. Networked learning is an area which has both practical and theoretical importance. It is a rapidly growing area of educational practice, particularly in higher education and the corporate sector. It is centered on some key social, personal and technological challenges of our time. It raises issues about learning as a cognitive achievement and as a social practice, and about the use of the Internet in the accomplishment of individual and collective goals. It raises questions of identity and belonging, conflict and co-operation, change and continuity. It creates new opportunities for examining stubborn problems, and makes visible a number of aspects of learning and teaching that are generally rather hard to see, describe and understand. For such reasons we claim that the area of networked learning, far from being an esoteric corner of educational technology practice, offers a highly productive site for advancing research in the learning sciences.

#### Networked learning: defining the territory

The terms e-learning, Web-based learning and online learning are now widely used in education. We use the term *networked learning* to mean a distinctive version of these approaches. 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 online materials and with other people. But, in our view, use of online *materials* is not a *sufficient* characteristic to define networked learning. Human–human interaction, through computer-mediated communication or CMC, is an essential part of networked learning.

The interactions between people involved in networked learning 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. E-mail is the best-known example of ICT-enabled asynchronous interaction and the various kinds of Web ‘chat’ represent synchronous interaction. Asynchronous computer conferencing, using tools such as FirstClass, WebCT or Blackboard, has rapidly become one of the most common kinds of ICT-based learning experience for students in higher education.

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 higher education practice, text is still 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.

The centrality of human interaction, in our conception of networked learning, carries with it some pedagogical commitments and beliefs about learning. In short, there is no point to networked learning if you do not value learning through co-operation, collaboration, dialog, and/or participation in a community. It is not surprising that some kind of high-level pedagogical consensus emerges around networked learning, though there are variations in the details of educational design and practice (Jones, Asensio & Goodyear, 2000). The deeper rationales for the salience of co-operation, collaboration, community and dialog also vary somewhat. In some cases, the underpinning values are those of liberationists or radical pedagogy (see, e.g., McConnell, 2000). Dialog with trusted peers helps one recognize, critique and move beyond one’s taken-for-granted assumptions – about the world, and about one’s professional practice and learning. In other cases, the use of networked learning has roots in models of learning and cognition from educational psychology – models which try to account for the connections between dialog and understanding or between collaboration and effective problem-solving (see, e.g., Dillenbourg, 1999; Tolmie & Boyle, 2000; Goodyear, 2002). A third line of thinking emphasizes community, practice and identity – seeing learning in terms of legitimate and decreasingly peripheral participation in a commu-

nity of practice or emphasizing the situatedness of learning within on-going activity systems (Lave & Wenger, 1991; Engeström et al., 1999; Palloff & Pratt, 1999; Lockyer et al., 2002 and see also the papers from symposia on networked learning and community in Banks et al., 2002).

These three sets of perspectives are not necessarily in opposition with each other, or even mutually exclusive. And at the quotidian level of networked learning practice – that which may be observed in a casual glance at the activity within a couple of networked learning courses – it would often be hard to infer much about differences in underpinning rationale.

Research in networked learning does not have a long history. Nor is there yet a substantial corpus of good empirical research. This makes it particularly important for researchers to be clear about their research goals and to try to explicate the connections between course activity and more deep-seated pedagogical intentions. Without such clarity, it can be hard to understand why a particularly successful (or failing) episode of collaborative activity is important, or why facilitating such-and-such a form of discourse is worthy of scrutiny.

Research in this field has not just been criticized for its failure to be explicit about research aims and pedagogical goals. Salmon (2002) offers a concise summary of documented weaknesses: that we know much more about students' reactions to networked learning experiences than we know about learning outcomes; that we know more about the quantity of student interactions than we know about their quality of their communication (or its relationship to learning); that published accounts are generally restricted to data drawn from a single course but that, paradoxically, contextual factors are often neglected; that we know much more about the sending of messages than the receiving of them.

No single book is going to restore the balance. Furthermore, there are many gaps in our understanding of students' perspectives on networked learning, or patterns of interaction and online discourse. And there are many reasons why it is highly desirable to take a case-study or action-learning approach to researching some of the key questions in this field (see, e.g., the arguments advanced in chapters 2 and 3 by De Laat and Lally and Levy). Our aim, then, in putting together this collection, is both to consolidate our collective sense of the state of research in the field and to highlight some of the largest or most important gaps. We hope we have succeeded in bringing together some of the best research in the field, and in using it to signpost some directions for future work.

## Origins

The origins of this book lie in a two year seminar series, funded by the UK Economic and Social Research Council and organized by Vivien Hodgson, David McConnell, Sarah Mann and Liz Beaty. The seminar series was concerned with achieving a better understanding of the implications of networked learning for higher education. The seminar series had three main aims:

- to contribute to the understanding and practice of the use of networked learning in higher education,
- to stimulate debate through a critical examination of relevant literature, current practice, and studies of teachers' and learners' experiences of networked learning and
- to pay attention to key socio-economic issues that impact upon education and the learning process and experience.

The series also had three main themes:

- understanding the learner's and teacher's experience of networked learning,
- theorizing the nature and status of knowledge, learning and identity in networked learning and relating this to the design, organization and assessment of networked learning courses and programmes and
- examining the implications of networked learning for restructuring education and changing the role of the teacher/tutor, with a special focus on institutional readiness and the management of change.

The seminar series had a number of outcomes, including the presentation of research through a number of symposia at the 3rd International Conference on Networked Learning, held at the University of Sheffield (UK) in 2002. A selection of the presentations at this event were subsequently worked up to form chapters in this book. Each chapter went through a process of peer review and redrafting: a process made easier and more productive by the relationships and common understandings that had been forged during the two years of the seminar series.

## Overview of the main chapters

Maarten De Laat and Vic Lally describe their high-level research aims in terms of an improved conversation between theory and praxis in networked learning. Their theoretical position is influenced by social constructivism and socio-cultural theory. From both sources, they draw ideas about the centrality of knowledge (re)construction and its relations with discourse and the social context. Among other things, they want to understand how to connect recognizable and discrete kinds of online discourse with the key processes of

knowledge construction. Recognizing that discussion transcripts alone give little access to an individual's cognitive processing or meaning-making, they deploy a two-pronged research strategy. They have adapted and developed powerful and efficient methods of coding discussion transcripts, to index cognitive, affective and metacognitive learning activities. But they also use the output from these methods as input to critical event interviews with course participants (learners and tutors). In this paper they focus on the tutor, drawing our attention to some of the ways in which a tutor can enact facilitation, through careful monitoring of group activity and through varying the amount of guidance according to their sense of the group's changing needs.

Phil Levy echoes the concern for networked learning praxis – for 'informed committed action that gives rise to knowledge' – and for forms of knowledge which are capable of guiding action. She synthesizes an approach she labels 'networked action research', which is (a) available to the practitioner and (b) capable of generating useful knowledge (e.g., in helping guide educational design). She is cautious about generalized and abstracted knowledge, preferring the embodiment of knowledge in 'living theory', such as conceptual frameworks and working models for *actual* networked learning courses. Her action research approach is intrinsically involved with multiple data sources and multiple, complementary ways of gathering data and sustaining research conversations with the other actors in the situation.

Rachel Pilkington and Aisha Walker focus even more sharply on discourse: in this case, the synchronous discourse of online chat sessions. They hypothesized that synchronous discussion would be more productive if students (a) recognized and (b) adopted different roles in the discussion. These roles fall under three headings: management, community-building and argumentation roles. Management roles are concerned with such issues as negotiating the task to be accomplished, fixing time schedules, securing resources, etc. Community-building roles focus on the development of trust, reciprocity and other shared values within a group. Argumentation roles involve working to improve educational dialog, for example by provoking creative conflict, challenging speakers to provide stronger support for the claims they are making, etc. Given the very limited educational benefits thus far demonstrated for synchronous online discussions, such research is urgently needed. Pilkington and Walker's data sources consisted of the online transcripts, which they analyzed for patterns of activity associated with the roles, and students' grades on some selected assessment tasks. Considerable evidence was generated for the students' ability to take on and work with the notion of roles and for this to improve the coherence, depth and focus of the discussion.

The article by Peter Goodyear, Vivien Hodgson, Chris Jones, Mireia Asensio and Christine Steeples broadens the scale of inquiry considerably.

As they remark, it is still relatively rare for research in this field to gather data from a range of courses in different institutions. It is much more common for researchers to investigate courses which they have helped design or on which they teach. Using survey data gathered at the start and end of four undergraduate-level networked learning courses, Goodyear et al. compare students' expectations about, and experiences of, networked learning. The article provides some useful benchmark data. For example, the students on the courses were generally quite positive about networked learning, and though the strength of their support declined over time, the pattern of their reported feelings remained relatively stable. There was little to indicate that networked learning is disproportionately preferred by male or by younger students. The main influence on how positive the students felt proved to be how well networked learning was integrated into the course. Though this outcome may not be surprising, it is clear that managing such integration is a non-trivial task.

Maria Zenios, Frank Banks and Bob Moon report on the use of networked learning in teacher preparation programmes at the UK Open University. Echoing the outcomes of the work by Goodyear et al., they too focus upon organizational issues – how the relationship between the networked learning activity and the course within which it was set affected the kinds of discourse to be found in the online transcripts. Zenios et al. also point to some subject-based differences and some changes that occur over time, as the students become more used to the networked learning environment. For example, two factors seem important in shaping the nature of discourse among students who are preparing to teach in some area of Science. First, there appears to be sufficient consensus about general issues in the teaching of science for participants to have a sense of a shared understanding of the problems being discussed. Secondly, the fact that some were teaching Biology while others were teaching Physics or Chemistry meant that everyone was (in relative terms) an expert in some domains and a novice in others. This gave everyone a basis on which to offer and solicit advice. In contrast, the students who were preparing to become teachers of English had much more varied views about fundamental issues to do with the nature of English as a school subject – there was little shared ground but a rich diversity of opinion from which flowed a very different pattern of discourse.

Shirley Booth and Magnus Hultén also focus on conference transcripts. They describe research in which they scrutinize conference transcripts for signs of 'learning moments'. They look for pivotal contributions in the discourse – for evidence of the 'joint constitution of insights'. Their perspective is phenomenographic (see, e.g., Marton & Booth, 1997) and so they are particularly attentive to episodes in the discourse when opportunities are created for seeing things in new and qualitatively different ways. In the language of

phenomenography, they speak of ‘opening dimensions of variation’ around critical features of a task. This interpretation of what is important about language and learning allows them to construct a taxonomy of contributions to the online discourse: participatory, factual, reflective and learning contributions. They argue that getting networked learning tutors to spot pivotal contributions may be a very good way of helping them monitor and improve the activity within online conferences. This may provide a better basis for guidance about when to intervene, when not to intervene, and how to intervene, than can be derived from general pedagogical principles.

Maddy Sclater and Klara Bolander also investigate issues of collaboration in networked learning. They unravel some of the contradictions and tensions which arise when students are set a task in which they are asked to collaborate, but where the wider context is one which privileges assessment at the level of the individual and where participants have varying degrees of commitment to collaboration. As with the two preceding chapters, Sclater and Bolander draw their data from a single case study and especially from transcript and interview data. They describe in detail the working methods of three groups of students – each group having been asked to collaborate in the production of a paper. The working methods contrast substantially, and also vary through time, illustrating various ways in which students manage the risks and complexities associated with group work. One of their conclusions resonates with the theme of organizing and integrating networked learning – that students’ understandings of what is being asked of them are tightly intertwined with their sense of the value of collaboration in learning. Explicit discussion of collaborative processes, their value and risks, ought to be salient during induction into networked learning activity. Teachers cannot safely assume that the benefits of collaboration are self-evident or uncontested.

Just as Phil Levy refuses to allow the researcher to escape to the shadowy peripheries of the research process, Sarah Mann puts the researcher firmly in the centre of attention. It is becoming a commonplace observation that the experience of being an online learner should be part of the training of any online teacher. Sarah Mann reflects on her first experience as an online learner, in part to crystallize some thoughts about how to sharpen the sensibilities of the online teacher. She argues that gaining a personal experiential understanding of a new domain is a valuable early step in researching it. She gives us good reason to take to task those who make facile use of the expression ‘learning community’. Among other things, she points to the shock of discovering ‘groups within groups’ and of whole areas of discourse, relationship and group history that were not openly shared with new group members. She notes the additional complications of creating and managing one’s online presence. She feels the *weight* of the words which are (supposedly) one’s only



way of constructing an identity and managing one's relationships with others. From her account come ideas about what teachers and learners in networked learning situations need to do to foster, rather than assert, community: ideas about trust, welcome, empathy but also about the valuing of criticality and difference.

Gillian Roberts closes the main group of chapters with what might be mistaken for a note of gloom. She uses a phenomenographic approach to researching teachers' conceptions of, and approaches to, teaching (cf. Prosser & Trigwell, 1999; Kember & Kwan, 2000). This approach allows one to distinguish teachers who are more comfortable talking about teaching as the transmission of a body of knowledge from teachers who are more comfortable talking about teaching as the facilitation of student learning. Roberts examines conceptions of, and approaches to, teaching using the World Wide Web. She concludes that very few teachers appear to conceive of, or approach, their teaching in ways that are compatible with the valued aspects of networked learning, sketched in this introduction. The problem is not (as used to be thought) that teachers are reluctant to use new technology. The issue runs deeper than this, insofar as teachers' conceptions of teaching may be held to be less open to change than their practices with respect to using new technology. The light in the tunnel comes from Roberts' suggestion that involvement in new ways of teaching can precede a change in 'deeper' conceptions. That is, the availability of the technology of networked learning affords opportunities for teachers to experiment with new ways of teaching and their subsequent reflection on their experience may cause them to re-examine and even shift some of these 'deeper' beliefs (cf. McAlpine & Weston, 2000). We need to be careful here. This is not a simple-minded argument for technological determinism. Rather, it points to the danger of assuming that beliefs are entrenched and foundational, rather than locked in a dialectic with practice and experience.

Taken together, these papers represent a major contribution to our collective sense of recent progress in research on networked learning. The range of topics and methods attests to the vitality of this important field of work. More significant yet is the complex understanding of the field that they combine to create. In combination, they help explain some of the key relationships between teachers' and learners' intentions and experiences, the affordances of text-based communications technologies and processes of informed and intelligent educational change.

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## Chapter 2

### **Complexity, theory and praxis: Researching collaborative learning and tutoring processes in a networked learning community**

MAARTEN DE LAAT & VIC LALLY

**Abstract.** This paper explores the complexity of researching networked learning and tutoring on two levels. Firstly, on the theoretical level, we argue that the nature of praxis<sup>1</sup> in networked environments (i.e., learning and tutoring) is so complex that no single theoretical model, among those currently available, is sufficiently powerful, descriptively, rhetorically, inferentially or in its application to real contexts, to provide a framework for a research agenda that takes into account the key aspects of human agency. Furthermore, we argue that this complexity of praxis requires a multi-method approach to empirical investigation, in order that theory and praxis may converse, with both being enriched by these investigations. Secondly, on an empirical level, and as an example that draws upon our theoretical argument about complexity, we present the findings of a multi-method analysis of the learning and tutoring processes occurring in an online community of professionals engaged in a Master's Programme in E-Learning. This investigation is informed by two mainstream theoretical perspectives on learning, and employs computer-assisted content analysis and critical event recall as complementary methodologies. This study reveals the differentiated nature of participants' learning, even within a highly structured collaborative learning environment, identifies some of the key functions and roles of participants, and provides an indication of the value of such multi-method studies. Future prospects for this approach to research in the field are considered.

**Keywords:** content analysis, critical event recall, networked learning, online communities, praxis, theory, tutoring

### **Introduction**

This paper is an attempt to address some of the complexities of researching networked learning (NL) in higher education contexts. Our wider set of concerns and interests in this work cluster around trying to research and illuminate how theory and praxis interact in a range of networked learning environments. One might view this 'interaction' as a kind of exploratory conversation between theory and praxis (in which workers in this field are engaged). In its creative phases this might develop from a mutual articulation of theoretical underpinnings and rich analytical descriptions of praxis, to a systematic and rigorous searching for ways in which each might deepen and enrich the other, leading to improvements in learning for participants in NL

environments. This idea, of a theory–praxis conversation or interaction, was developed by Stenhouse (1983). He argued that the development of a theoretical understanding of *educational* action and doing *educational* research into the practical problems of education are inseparable. If educational research focuses on the problems which arise in trying to realize a form of *educational* praxis, then it will pose questions both about which actions in the context are constitutive of such praxis and about the educational criteria employed in deciding this. To summarize, educational research, on Stenhouse's account, is a process which involves the joint development of educational praxis and theory in interaction (see Elliott, 2001 for a summary of Stenhouse's arguments).

Our approach, in this paper is, firstly, to explore some of our general concerns about the complexity of the interactions of theory and praxis in the field of networked learning. We then go on to provide a specific example of this conversation and its difficulties through an account of some of our own recent research into learning and tutoring in a networked learning community.

Halverson (2002) has cogently articulated four ways in which theory might contribute to this conversation in the context of networked learning environments. These are through its:

- Descriptive power: providing a conceptual framework that helps us to make sense of and describe the phenomena we are engaged in.
- Rhetorical power: helping us to talk about these phenomena and speculate about ways in which the theoretical ideas 'map' onto our experience of them.
- Inferential power: providing us with ways of advancing our understanding by helping us to ask new questions and intervene in creative ways, as educators, in the contexts that we are investigating and in which we are participating.
- Applicatory power: informing the ways in which we design and engage in pedagogy to support learning.

One of the themes of the present paper is complexity. We argue that this applies both to theory and praxis. Such is this complexity that, given the current state of the conversation between theory and praxis in the field of networked learning, we contest that no single theoretical framework is yet capable of offering us a sufficiently powerful articulation of description, rhetoric, inference or application. This point has been well argued by Paavola, Lipponen and Hakkarainen (2002) who describe the ways in which some of the theoretical models currently available to workers in this field may complement each other, while pointing out that there are many fundamental differences between these models in terms of both focus and power; yet, all the models they describe are currently in use by workers in the field. One explanation of

this situation may be that, as a research community, we are still in the process of coming together to engage in theory–praxis conversations, still emerging from the fields that informed the genesis of our interests in networked learning. Furthermore, perhaps we have not yet, as a research community, fully and openly acknowledged the complexity of researching the central educational processes of learning and teaching. However, this complexity does not end with theoretical plurality, immaturity, and a reluctance to acknowledge this complexity in the field. The nature of our educational interactions (our praxis), as learners and educators, with each other, and with the artefacts (texts, computer systems, language) of our networked environments is also complex, consisting of multiple individual and group processes. More progress has been made in articulating a coherent synthesis that provides a framework for teaching (pedagogical) processes (Goodyear, 1999). However, as Goodyear acknowledges (2001, pp. 7–8), the task of analyzing online texts and connecting this analysis to learning is troublesome because of the theoretical difficulties of linking language to learning. Parallel problems arise when analyses of online tutoring are undertaken. Our research context for this paper (see below for details) is a course in which participants engage in learning processes, tutoring processes and action research processes. All of these are located primarily in the overlap between their own individual professional contexts and the more formal shared context of the Master's Programme. We acknowledge that this complexity of praxis requires further articulation than is possible in the present paper, and will form a focus for future work.

The learning and tutoring processes that form the focus of the research described in this paper are only one aspect of human agency in educational contexts (see Taylor (1992) for a broad analysis of the philosophical scope and social evolution of human agency). As well as learning, tutoring and research, this agency also includes processes of identity formation, motivation, intentionality and achievement.

While our ambitions for future work include our intention to address these processes in NL environments, they are also outside the scope of the study reported here. However, other workers have already begun to investigate these aspects of agency in NL. Mann (2004), for example, has begun to investigate the implications for pedagogy of learner identity. Young, Depalma and Garrett have begun to explore the role of human intentionality in interactions between participants and learning environments (Young, Depalma & Garrett, 2002). Niven, Harris and Williams (2002) have investigated the significance of motivation in the development of an online learning community. Broader academic discussions about the interactions between individual characteristics of learners and Web-based environments are now also beginning to emerge in mainstream educational research journals, albeit focused more on

school level studies than higher education (see, e.g., Hartley & Bendixen, 2001).

There is yet a further set of concerns, adding another layer to the complexity of the theory–praxis conversation. To develop the metaphor a little further, one might say that the language of this conversation is partly determined by the *syntax* of methodology. One requirement of the power of theory is that it should contribute to the conversation by indicating what we might focus on in real learning situations. But theory does not necessarily indicate by what means we should focus. Experience of praxis, for those engaged as learners or tutors in any NL context, leaves us with an awareness of the complexity of processes occurring between participants. What methods are best suited to systematic and rigorous analysis? How might these methods complement one another? Methodology assists the conversation between theory and praxis by providing the rules for their interaction. However, as a community of researchers, we are still confronted with the methodological challenge of agreeing the rules.

At the Fifth International Conference on Computer Support for Collaborative Learning, in Boulder, Colorado (Stahl, 2002), one of the stated aims was to articulate a new paradigm for “a distinctive form of learning research”. However, a browse through the conference proceedings (CSCL, 2002) soon reveals that, despite this, only a small minority of the 50 long papers focused on the methodological issues and practicalities of researching learning in networked environments. In some ways this was disappointing and perplexing, given the stated aim. At the same time it is understandable. The challenges to be faced in researching learning are at once attractive, but also formidable.

The analysis of the content of discourse within online communities provides a useful example of these methodological challenges. Here the processes of praxis are mediated by a virtual learning environment (VLE). This can create the comforting feeling, for unwary researchers interested in analyzing educational praxis, that the transcripts of discussions taking place in the VLE contain easily accessible and potentially significant evidence of learning, tutoring, or research processes among the participants. There is no manual transcription to undertake, and it is clear who said what, and when. Initially then, the methodological challenge might, apparently, be easily resolved in terms of analytical tools through the employment of content analysis of the written messages (see Popping (2000) for an extensive account of these procedures). However, content analysis is cumbersome and time consuming. The choice of coding categories is a complex issue in itself, and the application of complex coding schemas by co-workers may lead to further problems in resolving issues of validity and reliability, arising from subjectivity in the application of the schemas. More fundamentally, the available theoretic-

cal frameworks may not be sufficiently robust to enable valid inferences to be made about any of these processes from the textual traces. Furthermore, what does one do about those aspects of learning that are not expressed in, and therefore not amenable to, content analysis? This difficulty has been acknowledged and articulated by a few workers in the field (notably, e.g., Jones & Cawood, 1998). However, there are very few studies that attempt to triangulate content analysis with other robust qualitative approaches that might offer access to evidence of the processes under discussion (see, e.g., Hara, Bonk & Angeli (2000) for one of the few studies in the field to articulate these methodological difficulties).

The emerging reality of our own recent work in this area, is that the nature of interactions among participants in online educational communities is sometimes very complex and multi-dimensional. It is not easy to research the processes of these interactions using any single method. This has been a stimulus to us to explore a multi-method approach to understanding interactions among members of these communities and, in so doing, attempt to reveal and understand the richness of processes beyond the capability of any one of the methods, when used by itself.

In this paper we share some of our findings from the application of computer assisted content analysis (Popping, 2000) to asynchronous discussion transcripts of the E-Learning M.Ed. at the University of Sheffield (formerly the M.Ed. in Networked Collaborative Learning). Specifically, the empirical findings in this paper arise from our focus on the content analysis of individual contributions and differences in learning and tutoring processes. This is integrated with the use of Critical Event Recall (CER) to probe learning and tutoring processes that may not be expressed in the actual text records used as data for the content analysis. Elsewhere (see, e.g., De Laat, 2002) we are exploring a combined approach using social network analysis and content analysis to relate patterns of group interaction to learning and tutoring processes. In future reports we will explore the dynamics of group learning and tutoring processes over time, and relate these to the individual patterns described in this paper. In methodological terms we aim to move toward a more coherent synthesis of content analysis, critical event recall and social network analysis. However, this is a longer-term aim of our research programme.

### **Theoretical complexity as a basis for understanding learning and tutoring processes**

Arising from our earlier argument about the complexity of the theory–praxis conversation, we contest that there is a need to draw on a plurality of the-

oretical perspectives in order to develop both theory and praxis through a conversation between them, mediated by multi-method analysis. In this section we outline briefly some of the key theoretical ideas upon which our recent work, and the present paper, are based. We also indicate how the overall direction of the work draws upon each of these ideas, and the kinds of analysis to which each perspective has led us. In this work (e.g., Barrett & Lally, 1999; De Laat, De Jong & Simons, 2001; De Laat, De Jong & Ter Huurne, 2000; Lally & De Laat, 2002; Lally & Barrett, 1999) we have attempted to explore a range of aspects of collaborative learning and begun to develop analytical frameworks in order to understand the complex tutoring and learning processes that are occurring in learning communities. We contend that the interaction between tutoring and learning processes is of central importance in all educational endeavors. Therefore, one of our central aims is to inquire systematically into this key educational interaction. Unless we make rich links between tutoring processes and students' learning processes it is difficult to fully understand or improve these processes. This is not a new idea in some senses: teachers will naturally claim responsibility if their students are successful in examinations. In their attribution, their tutoring acts have brought about learning in their students – as measured by the output, usually examination performance. But it may be a rather bold and unhelpful assertion. It offers no detailed insight into what 'worked' and what 'didn't'. Therefore, it provides no local evidence base on which the individual teacher can act about the details of her tutoring. Nor does it provide any systematic basis for communicating the effective and efficient aspects of praxis to others. Learning and tutoring, as ongoing sets of processes, happening in time and space, within an individual or a group, do not feature in detail in this general analysis. Sotto (1996) has argued this point very cogently: that good tutoring in higher education is far from self-evident, and that its connection to learning is complex, both in terms of learning outcomes at the end of an event, and learning processes occurring during that event.

### *Constructivism, situativity and group learning*

We have premised the analysis and theorizing in the present paper by drawing on several theoretical perspectives about learning. One of these is a social-constructivist view of learning that also considers the situativity of learning processes. This leads us to focus on a search for evidence, in the online discussions, of cognitive processes in which participants link new knowledge to their prior knowledge, and actively construct new internal representations of the ideas being presented (Boekaerts & Simons, 1995). We also draw on ideas about the meaningfulness and situativity of learning. That is, we view learning as a set of processes by which the learner personalizes new ideas by



giving meaning to them, based upon earlier experiences. However, meaning is also rooted in, and indexed by experience (Brown, Collins & Duguid, 1989). Therefore, each experience with an idea, and the environment of which that idea is part, becomes part of the meaning of that idea (Duffy & Jonassen, 1992). Learning is therefore understood and viewed by us as situated by the activity in which it takes place (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991). This view has led us to also seek evidence, in the online texts, for the cognitive, social and affective processes in which participants engage in trying to make meaning of the ideas presented to them by the tasks they are undertaking. We have also used Critical Event Recall (CER) to try to access the meaning making, and awareness of context, that participants use to make judgments and engage in activities in their course of study.

In our thinking we have also drawn on a wide body of work that has focused more explicitly on the social or group dimensions of learning. Influenced principally by the work of Vygotsky (1962, 1978) many authors (Dillenbourg, 1999; Goldstein, 1999; Lave, 1988, 1996; Lave & Wenger, 1991; Levine, Resnick & Higgins, 1996; Moll, Tapia & Whitmore, 1993; Resnick, 1991; Salomon & Perkins, 1998; Smith, 1994; Wegerif, Mercer & Dawes, 1999; Wertsch, 1991), have focused on the role of the group in shaping and driving individual cognitive (i.e., learning and tutoring) processes (group-mediated cognition or gmc). Key aspects of this view include the suggestion that, in a group meeting, the situation itself may exert a strong mediating effect on individual cognitive and conceptual processes: the thinking of individuals is influenced by the group in which they are working. Furthermore, the merger of intellectual and social processes may be another fundamental feature of group-mediated cognition. A third key feature is the tension between the conceptual structure or understanding (of the problem or ideas under discussion) of the group and that of the individuals within it. These individual understandings may vary from each other as well as from the group. This tension may be the driving force for the collective processing of the group. So, for example, when an individual member of the group expresses his or her opinion in relation to the shared public understanding of the group, this may be based on an attempt to synthesize this understanding with the public (that is group or shared) one. The other members of the group might compare this new synthesis with their own understandings of the group-accepted version and their own disagreements with it. Depending on the outcome of this process there may be further interaction and negotiation until a new meaning or understanding is accepted by the group. In this way interaction between individuals, as well as their shared and individual cognitions, can be viewed as key aspects of the co-construction of knowledge, meaning and understanding. Our interest in the cogency of these ideas has

led us toward a parallel focus on individual processes and group processes, as well as the interactions between them, in the group activities that are the focus of our empirical work. However, in this study we report on our work with individual processes within the group. Our work on group processes and interactions will be reported later, and synthesized with the present study.

### *Socio-cultural theory*

The other perspective that we have drawn upon is socio-cultural theory. Whereas the social-constructivist perspectives makes a distinction between the individual cognitive activities and the environment in which the individual is present, the socio-cultural perspective regards the individual as being part of that environment. Accordingly, learning cannot be understood as a process that is solely in the mind of the learner (Van Boxtel, Van der Linden & Kanselaar, 2000). Knowledge, according to this perspective, is constructed in settings of joint activity (Koschmann, 1999). Learning is a process of participating in cultural practices, a process that structures and shapes cognitive activity (Lave & Wenger, 1991). The socio-cultural perspective gives prominence to the aspect of mutuality of the relations between members and emphasizes the dialectic nature of the learning interaction (Sfard, 1998). Construction of knowledge takes place in a social context, such as might be found in collaborative activities of the M.Ed, in E-Learning featured in this paper (see McConnell (2000) for a much more detailed exploration of collaborative learning). In addition, Lehtinen et al. (1999) argue that conceptual understanding is fostered through explaining a problem to other students. Therefore, in collaborative learning it is necessary to formulate learning objectives, to make learning plans, to share information, to negotiate about knowledge and to take decisions (Veldhuis-Diermanse, 2002). In a setting of collaborative learning, students can criticize their own and other students' contributions, they can ask for explanations, they can give counter arguments and, in this way, they will stimulate themselves and the other students. Additionally, they can motivate and help each other to finish the task. Arising from our interest in these ideas is a need to focus on tutoring processes, that is the processes of interaction by which participants guide, facilitate and structure the contributions of others, and in so doing modify and develop their own learning processes. To probe the online texts for evidence of these processes we have employed a second coding schema for content analysis, which we will describe below. In conclusion, we contend that this complex collection of theoretical ideas, drawing on social-constructivist and socio-cultural theory, and ideas about situativity, is necessary to take account of the real complexities of individual and group processes in the networked learning context that is the focus of our study. Furthermore, we have tried to indicate how,

together, they direct us toward a focus on individual and group processes, toward the interactions between these, and toward learning and tutoring. They also suggest the kinds of methodological tools that might help us understand and investigate collaborative learning in our networked community.

### **Analyzing individual learning and tutoring processes in a Master's Programme**

The students featured in this analysis are undertaking a Master's Programme in E-Learning that is based upon an action research approach to professional development. It is an advanced part-time programme designed to provide participants with opportunities to engage with theory and praxis of collaborative networked tutoring and learning. The programme is based upon the establishment of a 'research learning community' among the participants and tutors. In this community activities are undertaken around five workshops over a two-year period. The programme is hosted in the electronic learning environment WebCT. Some course resources are provided to participants in printed format. Students also communicate with each other, and the designated university tutor, informally and outside the course environment. The students are a sophisticated group of professionals, in several senses. Many are mature learners who bring more than one established and relevant body of expertise to the course with them. They often already have extensive postgraduate experience of higher education, are themselves professionally engaged with teaching responsibilities within their organizations, and are charged with developing e-learning within that organization. Some also have research experience in the natural or social sciences. In the course they become engaged in collaborative learning and tutoring processes (McConnell, 2000) as they support each other and the group as a whole in a range of structured activities. Tutoring processes in this course are not the exclusive domain of the designated tutors. They may be undertaken by any of the participants in this course environment. This kind of integration of learning and tutoring processes has been documented in other networked learning settings (Gartner & Riessman, 2000). The more traditional role of the 'teacher', with its central position, may be transformed within such collaborative structures, toward fostering an online learning culture in which participants take charge of their own learning and tutoring (Collinson et al., 2000).

## Methods

Our analysis is based upon work conducted by 7 students and a tutor in the first workshop of this programme (approximately 10 weeks' duration). We were particularly interested to explore the relationship between knowledge construction (learning) and tutoring processes as these evolved over time within the workshop.

### *Content analysis*

In the process of analyzing tutoring and learning processes of the participants in our group, messages from the workshop had to be coded and analyzed. The central purpose of coding, for us, was to extract, generalize and abstract from the complexity of the original messages in order to look for evidence of these processes, and use this to interrogate the theories about the situation that we had used to direct our investigation. This is a balance between oversimplification, resulting in the loss of subtlety and insight into complex processes, and over-coding where the themes and trends are still obscured by too many sub-categories. We used computer assisted data analysis software (CAQDAS) to achieve this. The main advantages of such an approach include: partial automation of the coding process, with increased speed of coding, and a wider range of ways to search, re-code and interrogate the coded data (in this case messages), including visual coding. We used NVivo 1.1-3 (Qualitative Solutions and Research, 1999) for this work, and set up the categories in our two schemas as 'nodes' within the NVivo system. Each message was imported as a text file and given a 'time-stamp' to indicate when it was posted in the original discussions in WebCT. It was also given other 'descriptors' including who authored the message, and the gender of the author. Once all the messages had been coded and described we used the search facility in NVivo to carry out two analyses. The results in this paper are based on one of these analyses: a search, by individual participant, for his or her contributions within each category of the learning and tutoring coding schemas. In a second analysis, reported elsewhere (Lally & De Laat, 2002), we looked at tutoring and learning processes for the whole group over time, in order to try to understand how the relative proportions of learning and tutoring processes changed over the lifetime of the group's work.

In order to probe collaborative knowledge construction and tutoring in this learning environment we 'coded' the contributions made to a 10 week discussion using two coding schemas. The coding process consisted of two steps: (1) dividing the messages into meaningful units (Creswell, 1998; Henri, 1992) and (2) assigning a code to each unit. We decided to segment messages into units of meaning by using semantic features such as ideas, argument

chains, topics of discussion (for further details of this approach to the definition of units of meaning see Chi, 1997; Ericsson & Simon, 1984) or by regulative activities such as making a plan or explaining unclear information. Thus, the content of the messages had to be read for meaning to determine segment boundaries. Although it may be considerably easier to use syntactic boundaries to segment messages (such as sentences), we followed the semantic boundary approach to attempt to obtain a more finely grained analysis that more closely reflected the meaning of the phrase or paragraph.

The first coding schema (developed by Veldhuis-Diermanse, 2002) was used to investigate knowledge construction processes (see Appendix 1 for details and examples of indicator phrases). This included four main categories: cognitive activities used to process the learning content and to attain learning goals; metacognitive knowledge and metacognitive skills used to regulate the cognitive activities; affective activities (used to cope with feelings occurring during learning), and miscellaneous (used to score all other units). Our intention was to try to reveal something of the participants' thinking, as expressed in their message contributions, while they were undertaking the collaborative task. This coding schema was used to code units of meaning that we regarded as 'on the task', focusing on the learning processes used to carry out the course assignment. Although some codes of this schema are designed to identify cognitive expressions of the learning processes of individuals, some of the codes are targeted on processes that are social, and occur between individuals. Examples of these types of code include the metacognitive codes used to mark expressive, questioning, explaining, and sharing of ideas. The second schema focuses on units of meaning that are 'around the task'. We have called these tutoring processes and to probe them we adapted another published coding schema (Anderson et al., 2000). This includes three main sub-categories: design and organization, facilitation of discourse (Lipman, 1991; Scardamalia & Bereiter, 1994) and direct instruction. The work on cognitive apprenticeship by Collins and Brown (1991), Rogoff's (1995) model of apprenticeship in thinking, and Vygotsky's (1978) scaffolding analogies provide some of the theoretical basis for these categories. The intention here was to reveal something of the ways in which the participants were supporting each other's learning, and learning together, while undertaking the task. The choice of coding schemas is an important one for this type of work. It could be argued that a more 'grounded' approach, using categories that emerge from a reading of the messages, would provide a more 'authentic' summary of the intentions of the participants. In our view this is a valid and important way of approaching the analysis. However, we wanted to connect with some of the conceptual and theoretical ideas about learning and tutoring in the literature using schemas that were already in use, rather than create *de novo* categories.

At the same time we hope to be able to share our analyses with colleagues in other contexts by supporting the use of publicly available schemas as a basis for comparison within the research community. Both of these schemas have been used extensively by their originators, and we shall address the comparative aim of our work in future studies.

### *Critical Event Recall (CER)*

This method is a form of 'stimulated' event recall (Interpersonal Process Recall – IPR) to which one of the authors (Lally) was introduced by Jon Scaife at the University of Sheffield (UK). IPR is a process developed by Norman Kagan, commencing at Michigan State University in the early 1960s (Kagan, 1984; Kagan & Kagan, 1991). A broader theoretical and practical overview has been provided by Tuckwell (1980). The basis of IPR, as it was developed by Kagan and others, is the realization that humans store vast amounts of information, feeling, impressions and ideas about the events, or 'interpersonal processes', in which they have participated. Because of the speed at which human interactions occur much of the detail of these processes is soon 'forgotten', and not available for subsequent reflection. One of the present authors has used IPR extensively to help schoolteachers to analyze the teaching and learning processes occurring among the pupils in their classrooms (Lally & Scaife, 1995). When groups of participants engage in mutual or shared recall of events in which they have been present together they can gain insight into their behavior and learning processes. In a sensitively guided recall this can be of benefit for the future learning of the group, as well as the individuals within it. The recall enables the articulation of many previously unexpressed aspects of learning.

In networked collaborative learning environments such as the Sheffield E-Learning M.Ed. Programme (University of Sheffield, 2001), students and tutors are working in learning communities with many complex learning interactions occurring simultaneously. The use of the records of these interactions as a stimulus to recall of critical learning events occurring during the programme workshops suggests itself as a way of investigating those aspects of these processes not actively expressed during the events. We have termed this critical event recall, and adopted two approaches to undertaking it. In the first approach the participant is presented with summary analyses of the group and individual learning events. These give an overview of the patterns of learning and tutoring within the event (as presented in Tables 1–6 of this paper). In the second approach we use the full text of learning events. In both approaches the participant was presented with these items in advance of the recall sessions so that they might familiarize themselves with the summary analyses and full text of the events. In this paper we include the recall event

of one participant (the university tutor) using summary analyses and full texts from which he was able to choose what, for him, were the *critical events* of the workshop. In future studies we will present the results for all of the participants.

## Results and discussion

### *Content analysis*

The following tables (1–6) give the results of our analyses of individual and group (i.e., total) contributions to the workshop, using the two coding schemas. In the first analysis we coded learning processes, on the basis that we considered these to be the primary processes of the workshop activity. Tables one to three show the units of meaning coded for learning processes for eight individuals, including the tutor (Brian, denoted by \* in the tables). This coding represents a sample from three phases of the activity. The total number of messages from the workshop was approximately 1000. Our sample consisted of 10 percent of these messages, spread equally between the beginning, middle and end phases of online activity (each phase was a time sample of ten days duration). In a second coding analysis we coded for tutoring processes in the message sample. Tables four to six show the units of meaning coded for tutoring processes for the same individuals during the same time samples.

In this section we would like to offer some analysis of the results of the coding of learning processes (Tables 1–3). Firstly, however, it is important to add a general note of caution about this analysis. Clearly, learning processes are occurring within and between individuals in the group. However, all coding techniques are based on indicator phrases for each of the processes that are coded. We are assuming that the (internal) learning processes are actually represented by the expressions we are coding. This may not always be the case. The problem arises because linguistic expression of thinking is a conscious process in which a person is making active choices based upon his or her intentions and motivation. What he or she chooses to say may be a more or less accurate account of his or her thinking. This is a limitation of the coding process that must be borne in mind when evaluating the results of coding. Having said this, the codings do seem to suggest some clear patterns, over the three phases of the activity. In the beginning phase, we coded 42 units of meaning (60% of the total), from the expressions of learning processes in the text, as cognitive, and 15 units (20% of the total) as metacognitive (Table 1). This is the phase of activity when the task of carrying through a collaborative project, on an aspect of networked learning, is being concep-

*Table 1.* Units of meaning coded for learning processes during the beginning phase (note: pseudonyms are used here and in the rest of this paper)

Type of learning process	Learning processes of individual community members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Cognitive	0	2	4	1	17	5	11	6	46
Affective	0	2	1	0	4	1	3	0	11
Metacognitive	0	1	1	1	4	3	4	1	15
Miscellaneous	1	0	1	0	2	0	1	0	5
Total	1	5	7	2	27	9	19	7	77

*Table 2.* Units of meaning coded for learning processes during middle phase

Type of learning process	Learning processes of individual community members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Cognitive	5	1	0	7	8	9	14	18	62
Affective	2	0	0	0	0	0	0	1	3
Metacognitive	0	0	0	1	1	2	5	2	11
Miscellaneous	0	0	0	0	0	0	0	1	1
Total	7	1	0	8	9	11	19	22	77

*Table 3.* Units of meaning coded for learning processes in the ending phase

Type of learning process	Learning processes of individual community members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Cognitive	4	0	2	0	6	2	2	3	19
Affective	0	0	1	1	2	0	0	0	4
Metacognitive	2	0	0	0	1	2	2	2	9
Miscellaneous	5	0	1	1	3	2	0	1	13
Total	11	0	4	2	12	6	4	6	45

tualized for the first time by the group. Also the coding of affective activity produced the highest number of units of meaning in this phase (11 units, or 14% of the total). In the middle phase, however, this relationship changes. Units of meaning coded for cognitive activity rise to 62 (81 % of the total) while units coded for metacognitive and affective processes drop to 11 (14% of the total) and 3 (4% of the total) respectively. At this point in the workshop, participants are often thinking, and discussing the concepts of the task itself (Table 2). In our sample, this is the phase in which Charles and Margaret



were most involved. By the ending phase (Table 3) the units of meaning coding for cognitive processes have dropped back to 19 (42% of all units). The affective activity, as indicated by coded units, remains low (4 units or 8.9% of the total), but units coding metacognitive processes have risen; in this case to 9 (20% of all coded units). Also, coding for miscellaneous discussion has increased considerably, from 1 unit (1.3%) in the middle phase, to 13 units (28.8%) in this concluding phase. This suggests to us that as the group members complete their project they may be moving away from thinking 'on the task' and starting to discuss other matters that are not directly related to it. At the same time, individual profiles are discernible in these coding values. For example, Andrea is a student participant who makes extensive contributions to learning processes (as represented by the number of coded units) throughout the activity, although at lower levels in the middle phase. Katie, on the other hand, makes very few explicit contributions to any learning process. Charles has been active in both beginning and middle phases but is much less so at the end. Margaret (and Pauline to some extent) make extensive contributions during the middle phase, but much less at other times. Bill, on the other hand, seems to grow in confidence during the learning event, with few explicit contributions in the beginning phase rising to almost 25% of all contributions by the ending phase. During this activity the university tutor (Brian) contributes at a low level in the beginning phase; makes no expressed contribution at all in the middle phase, and a low level of contribution at the end of the activity.

In our second coding analysis we focused on attempting to code the text for tutoring processes occurring in the discussions (Tables 4–6). In this programme, based upon a learning community of professionals, the activities that we have described as tutoring include: direct instruction, facilitation, and curriculum organization (see Appendix 2 for details of the schema and examples of indicator phrases). It is important to note that these are not the exclusive domain of the designated (\*) university tutor. They are activities used and employed by all members of the group at different times. Our decision to try to probe these processes using a second coding schema was based on our own awareness of the strong interrelationship between 'tutoring' and 'learning' that may occur in such groups, arising from the socio-cultural framework outlined above. It is an important feature of this kind of collaborative online work on the E-Learning programme. The results of these tutoring codings are shown in Tables 4–6.

Once again, and within the limitations outlined above, some patterns are discernible. In terms of group totals firstly, the level of units of meaning coded for direct instruction remains at a low level throughout the entire activity. This is not surprising given that the group was engaged in a collaborative

*Table 4.* Units of meaning coded for tutoring processes in the beginning phase

Type of tutoring process	Tutoring processes of individual community members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Direct instruction	0	0	2	2	0	0	0	0	4
Facilitation	1	3	8	1	5	0	5	2	25
Instructional design	2	1	8	4	4	3	8	1	31
Total	3	4	18	7	9	3	13	3	60

*Table 5.* Units of meaning coded for tutoring processes in the middle phase

Type of tutoring process	Tutoring processes of individual community members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Direct instruction	0	0	0	0	2	0	0	0	2
Facilitation	3	3	2	4	24	5	6	7	54
Instructional design	2	1	3	2	5	0	1	2	16
Total	5	4	5	6	31	5	7	9	72

*Table 6.* Units of meaning coded for tutoring processes in the ending phase

Type of tutoring process	Tutoring processes of individual community members								Total
	Bill	Katie	Brian*	Pauline	Andrea	Felicity	Charles	Margaret	
Direct instruction	0	0	1	0	0	0	0	0	1
Facilitation	4	0	9	1	9	3	2	1	29
Instructional design	3	0	8	1	1	1	1	0	15
Total	7	0	18	2	10	4	3	1	45

activity that drew on members' own professional resources and other material to which they were directed before the activity commenced. Therefore, there was little need for anyone to provide this during the period of work that we analyzed. On the other hand, the level of units coded for instructional design in the beginning phase is high, at 31 (51% of the total) (Table 4). One interpretation of this is that it may arise from the group's need to help each other to get organized for the activity to come. In the middle phase (Table 5) coding for instructional design decreases to 16 units (22%) as coding for facilitation by group members increases from 25 to 54 units (41% in the beginning phase to 75% in this phase). Coding of units for facilitation continues at a high level into the ending phase, with 29 (64%), where instructional design units increases again, with 15 units (33%) as the group members plan and prepare

to review their work. Brian's contributions (the tutor, denoted by \* in the tables) are coded at high levels for tutor processes in the early and ending phases (Table 6), but less so in the middle phase. Some of the students, for example Andrea, make contributions that are coded at high levels for tutor processes. Indeed, Andrea sustains these units in the middle phase when Brian's contributions are relatively low. Margaret shows the same pattern to a lesser extent. The role undertaken by Charles is interesting because his coded tutor contributions are highest in the beginning phase and then decline in the middle phase and remain low in the ending phase. During this change evidence from coded units of his engagement in learning processes remains steady in the beginning and middle phase and decreases at the end. Bill again shows a growth in engagement, whereas Felicity seems to be a stable participant in the workshop as a whole.

### *Critical event recall interview*

The learning and tutoring patterns that have emerged from this coding analysis provide some insights into the dynamics of individual and group behavior in a virtual professional development environment. Group learning is dependent on the individual contributions. These individuals have different interests, agendas, and abilities in regulating the individual as well the group learning processes. The critical event recall interview with the tutor involved with the guidance of this group may help us understand some of these differences. The interview with Brian, using all six tables of summary analyses, occupied approximately 45 minutes. Time was spent at the beginning helping Brian to clarify the meaning of the numbers in the tables and the way in which they had been calculated from the coding. The interview was loosely structured, and tended to follow a natural pattern arising from the structure of the six tables we were using. After articulating patterns of individual behavior, gleaned from the summary tables, he began to recall his impressions, at the time of the event, of the learning and tutoring behaviors of the participants.

Starting with himself, Brian commented that the tables showed him to be much more active at the start and end of the workshop, and much less so in the middle phase:

That was certainly an active conscious decision. Because I knew that throughout, I had that as a sort of personal policy, to be there at the start and give them the space in the middle, and to come back in the end.

I am not surprised with that because I not only had that personal policy of starting with the profile and ending with a higher profile, but I also had a personal policy of explaining that policy to them as part of my personal philosophy. So I said to them that I'd try to be there at the start to clarify

the task and everything, left it to them in the middle and then be here again at the end, talking about ‘how was it for you’ kind of thing.

These excerpts illustrate the decision he made to be much more visible to the other participants at both the beginning and ending phase of the event, but to withdraw to a large extent in the middle phase of work. He went on to explain his thinking behind this strategy, and how it related to the way in which he wanted to give space to participants to work together and express their own ideas, not dominated by him. This revealed strategic pedagogic thinking about his role as a tutor and facilitator with special responsibilities (he represented the university in the group). It was clearly intended to support the learning processes of other group members, but was not expressed in the discussions of this particular group.

Brian expressed his role as a tutor and facilitator during this recall in two ways. In one way Brian was concerned with the learning process of the group and how to facilitate or mediate that. On the other hand he was constantly aware of the dynamics of the group.

Of the things I remember, looking back at this, are two things really. One is Charles’ role, his sort of ‘if you like’ behavior, and the other is trying to contain Charles, from my own perspective, while others had a chance to come in and have their say. Because Charles came forward, he was very strong really, very clear. And I remember thinking ‘well it’s really valuable to have that early sense of direction’, but the concern was that the rest of the people would not have a voice.

Now the other strong figure, and possible counter-figure, to it was Andrea; the great thing about her was that she was not only participating, but she was offering help as well, still being supportive and considerate of Charles’ view, but offering a wider possibility.

So I remember being particularly grateful that Andrea was there, and feeling at that point that there were two key figures in the group, and that it was these two figures I was (if you like) containing, or just working with and trying to hold and trying to avoid them making any decisions until the rest of the group appeared, because the rest of the group was slower in appearing.

Meanwhile Brian was not contributing much himself, but trying to keep a feeling of where the discussion was going to, ready to facilitate whenever he thought necessary. This is illustrated through the following excerpts:

The other thing was that I felt that Charles was concerned to get the task done, to get the group on board, and to get everybody active. And as the

project went on I was conscious that we weren't really thinking about the processes but acting on completing the thing. Rather than making decisions about a project topic.

I really felt like Andrea was almost doing a holding thing on Charles as well. Saying that, there are other possibilities. With my own message here I was trying to comfort and support Andrea a bit, as she was trying to hold back Charles eagerness and enthusiasm. Partly as a slight counter against Charles strong direction, and again just to buy time for the others to come in.

And although I have had put message in, I was staying as neutral as I could and trying to keep a small footprint on the thing.

As the discussion proceeded Brian felt he needed to act more directly to give the group some more support to help them to learn in this context.

I was just concerned that we did not have a lot of ideas for the project and that the whole thing might take a lot of time if they were going to succeed in completing it.

I did two things in this thread, if you like. One was to offer a model of how to organize as a group, and the other was to try and summarize all that had been said. This one was definitely an attempt to facilitate some progression.

Later on in the project when the group's thoughts and aims were more or less crystallized, Brian decided to withdraw.

I did not make many comments here compared to the starting phase, because the first phase was the preparatory thing and I was conscious of 'its got to happen and I have to get them there'. By the time it got to this [middle phase] they have taken over, so I was conscious of sitting back.

There were not many things that really caused thought in my mind, as it were. But I was tracking it, like a hawk really, but I was in a more relaxed mode.

This is the point where Brian started to focus more on the dynamics within the group.

I was beginning to have a slight sense of two groups forming, one was Andrea and Charles, as they were working quite closely together, and the other was Katie and Pauline, in the background, and Bill as well. Bill was trying to attach himself to Charles, I felt. Bill was struggling to find a place where he could contribute and talk.

I was conscious of Pauline supporting Katie at that time. Katie seemed to be someone who was struggling to hang on. They also seemed to become some sort of a subgroup and I was aware of that at the time, maybe Felicity was a member of it. Katie, I felt, was struggling to engage; the others seemed to be talking over her head. So there was a group – Andrea and Charles – who were really cracking on. They talked in models. Margaret also was able to join in that, although she wasn't very 'present'. But Pauline, Katie and Felicity seemed to be more shadowy figures, and Bill too.

Bill approached Charles to say: 'Is this something we could collaborate on?'; Katie expressed, instead, a problem that she was having. This struck me as a similar problem but obtained different responses. Bill was looking for somewhere to make an input. He found a niche in which he could do that, whereas the opposite happened for Katie. She did not try to establish a niche. She just simply said 'I am really struggling', and the response came from Pauline to say 'don't worry'. Andrea gave a more academic response whereas Pauline gave a more emotional response, I felt. It just seemed to be a different level of response, even though Andrea's was more comprehensive, Pauline's tone and style seemed to be more useful. Andrea was saying 'I will help you but I am up here doing this clever stuff' (not expressed like that, but sort of the summary of it). Whereas Pauline spoke to her as a person.

After recalling his own behavior in the group Brian started to elaborate on the behaviors of others. According to Brian, Andrea was a significant participant in the event.

She was an ever-present person, she had quite a high profile because of her personality, she was generally present in the social area.

And she also discussed her personal online tutoring practice. She was already familiar with such a role. So it is not surprising that she took on that role. [In the middle phase, when the tutor withdrew.]

She is very facilitative in all her communications.

She already had a strong model of how these things would play out and so she engaged in it, whereas Bill was struggling to understand it.

Brian realized at the time of the event that Andrea had considerable experience of working in the medium, and was able to recall this from seeing the summaries. He observed her facilitating others in the group, and her relatively high presence in the summaries caused him to comment that this was his strong recollection of the way she worked for much of the time in the 10 week

event. She was the biggest contributor of learning-coded messages at the beginning and end of the event, and replaced Brian as the biggest contributor of tutoring-coded messages in the middle phase, when Brian had deliberately withdrawn.

Charles was also very active (especially in the beginning) but seemed to have a strong personal idea about the task.

Yeah, well, Charles seemed to me very task-oriented. He seemed to be a do-er. He seemed really like he didn't want to think about it or talk about it: 'I have got this idea and I really want to try and implement it together'. And he really struck me as that; he was very active but as soon as it came to the discursive side of it he disappeared.

He is a very procedural person, and he had lots of clear ideas and experiences but he did not want to get into the dialog overtly, apart from 'how do we get this done?'.

This matches the individual coding patterns for Charles: high involvement in the beginning, to start up the project. Later on, when the community was in 'motion' and started to reflect more on their task, as Brian recalls it, Charles became less involved.

Bill was another participant in the group. According to Brian this way of learning was quite new to Bill.

My idea is that he was a sort of local person sent to do the course on behalf of the university or whatever; I thought it was a business school. So it would not surprise me that he did not have a clear idea about what to do and how to do it. But he was motivated and interested and talking about it locally. At the end he came in to say: 'right, well, based on that I think this is how it could be used for us locally'. So he was ready to contribute, but did not know how to, in the task.

[In the beginning] Bill was struggling to understand it.

For this reason, according to Brian's recall, Bill's level of participation, as reflected in coding for both learning and tutoring processes, was low. However, as he clarified his own purposes for being involved, Bill's participation increased. He was the second highest participant (by learning units) by the end [having been the lowest at the beginning], and third highest for tutoring units [having been equal lowest at the beginning].

Brian also recalled some of his thinking about the low level of participation of Katie.

It doesn't surprise me in some time senses, because she had difficult personal circumstances. So that could have contributed to it.

Her model of the experience to come was possibly of a more directive nature, so it was a struggle then to accept a new mind-set, of knowledge being distributed amongst themselves.

Brian also commented on Felicity, another active participant, as measured by units coded for learning processes. He thought she felt more comfortable thinking about the task than providing tutoring support for others. This is also supported by the coding analyses in Tables 1–6.

It will be interesting to be thinking about her because she was very communicative, good sense of humor and a very willing person.

She seems initially more a little bit like a procedural person. But later on she was ready to engage the reflective activity.

She was quite a strong person but did not dominate.

The recollections presented here indicate that the tutor engaged in many reflective and analytical observations about his own facilitation of the group and the behaviors of individuals within it, yet much of this thinking was not directly observable in the transcripts of the group's work. The teacher was making careful judgments about when and how to intervene based upon his interpretations of the needs and behaviors of individuals, the needs of the group, and his own largely unarticulated (in the group forum) values about the nature and purposes of collaborative learning. In summary, Brian was, as Jones and Asensio have articulated in detail elsewhere (Jones & Asensio, 2002), engaged in a social *process* of actively designing his involvement through his interaction, with a view to enhancing the learning of the group members. He was concerned, it would seem, to maintain balance and integration within the group, assist socially oriented processes of learning and tutoring, and foster collaboration among group members.

## Conclusions

This paper has attempted to address some of the complexities of researching networked learning (NL) in a higher education context on both theoretical and empirical levels by linking a theoretical discussion with an example of our recent work. Specifically, we are concerned to illuminate how theory and praxis interact in a range of networked learning environments with a view to enriching both. We describe this interaction as a kind of exploratory conversation between theory and praxis that may be mediated by methodology. We argue that there are several complexities in this endeavor. Firstly, while acknowledging the power of theory as a framework for both pedagogy and



research, we suggest that the complexity of praxis in networked collaborative learning environments is such that the models of social-constructivism, situated learning and socio-cultural theory are not, separately, capable of providing an account of the role of meaning making, the function of context or the power of the interaction between tutoring processes and learning processes. We have therefore drawn on all of these frameworks in this account of individual learning and tutoring, that is, we have used them as a means of thinking about the kinds of processes that might form a meaningful focus for our inquiry. Secondly, we acknowledge that the complexity of praxis is such that the empirical work reported here can focus only on a sub-set of the aspects of human agency that are pertinent to a holistic understanding of collaborative educational contexts. In this study we have chosen learning and tutoring processes as the focus of our research because we think that they are central to the pedagogical endeavor (a view informed by the theoretical perspectives upon which we have drawn in this study). However, it is also clear that richer theoretical descriptions than those we have employed may be required to take account simultaneously of more aspects of agency. For example, we have taken little account of individual and group motivation, although some features of the tutor's motivations are apparent in the CER interview. Thirdly, we argue that the complexity of the tutoring and learning processes that we encountered in the E-Learning M.Ed. are such that a multi-method approach is required to mediate the conversation between theory and praxis. This complexity has been reported in other online programmes (e.g., Hara, Bonk & Angeli, 2000). We note that our use of content analysis and CER (using summary analyses as a stimulus), is only one step in the development of a more sophisticated approach to the researching of this complexity across these contexts.

Empirically, this paper reports part of an attempt to study both learning processes and tutoring processes within a group of collaborating professionals in an online learning community. We have presented the results of an approach to content analysis of messages exchanged during a single professional development activity of approximately ten weeks duration. This analysis has enabled the tentative identification of patterns of individual and group learning during the activity. It has also allowed us to discern different individual roles in tutoring processes among these professionals (as revealed through coding of units of meaning and a CER interview). We have tentatively attempted to relate these to learning processes. We suggest that these analyses have added to our understanding of tutoring and learning processes by professionals in a learning community within an online Master's Programme. They show, for example, how participants may operate quite differently, and yet within discernible patterns, some being strong facilitators, while others

offer little support to their collaborators. There are many other implications in terms of differentiated patterns of working that we hope to articulate in future work. Through this approach we contend that it may be possible to gain deeper insights into how professionals collaborate successfully to develop their own practice, and into the complexity of the interactions between individual and group processes during these collaborations.

At the same time, we have indicated that the analysis of such complex interactions in learning communities presents a strong methodological challenge for researchers. The use of coding schemas, for example, is beset with difficulties. Their use to 'code' the messages is an attempt to 'categorize', and to some extent quantify the meanings embedded in the exchanges between participants. However, this is a considerable task. Because the total number of messages was around 1000 we had to 'sample' these in order to make the coding manageable. Hence the exchanges were sampled during the first ten days of the group's work, during the middle ten days and for a further ten days at the end (the three phases in Tables 1–6). This sampling approach was used in an attempt to retain meaning and coherence over time in the sampled episodes of work. We analyzed all the messages in selected threads rather than sampling across all threads. This was important to us because we wanted to look at the development of tutoring and learning processes in the group, over time, as well as at individual totals. We are aware that this approach still fragments the contextual meaning of the coded content to some extent, and further work is required to refine this methodology so that the relations of the coded units to its neighbors in the text can be seen. Furthermore, the coding schemas required to capture the complexity of the activities were necessarily complex in themselves. There was a total of 42 categories and sub-categories. Some passages of text could have been coded using more than one category, because of the multiplicity of meanings that could be inferred from the text. At these points we had to make judgments about this and agree them in 'coding conversations' between the two researchers. Given these difficulties, the use of coding in this way is still only a partial solution to the methodological challenges we identified at the beginning of this paper. Furthermore, coding of discussions in the social space that was created in WebCT, for use during the workshop, was not undertaken. Yet this space was a place where ideas were discussed, and relationships built that supported the group's work in the more formal group space (or forum).

Of course coding provides little insight into a key aspect of the individual and group processes: those that were not expressed in text messages. We have argued for the need to complement coding analyses with several complementary forms of analysis in order to understand more fully the richness of these learning interactions. In this study we have combined coding analysis with

critical event recall which is based upon the research of Kagan and others into the stimulation of recall of learning events using video records of those events. The recall episode used here is based on a single recall interview with the tutor in the featured group. Summary content analyses of the texts of the learning event were used as a basis for the stimulation of recall of critical events in the work of the group. This was then followed by recall based on the full transcripts of the workshop in which the tutor selected critical episodes upon which to focus his recollections. A significant finding of this study is that recall of important details of the tutor's thinking *at the time* of the original event is possible using summary analyses of this kind. This is enhanced further by the selection of critical events from the full transcripts. The recollections presented here suggest that the tutor engaged in many reflective and analytical observations about his own facilitation of the group and the behaviors of individuals within it, yet much of this thinking was not directly observable in the transcripts of the group's work. The tutor was making careful judgments about when and how to intervene based upon his interpretations of the needs and behaviors of individuals, the needs of the group, and his own largely unarticulated (in the group forum) values about the nature and purposes of collaborative learning. However these were not all tacit understandings of the processes, as he articulated his design processes to himself, both at the time and subsequently. Critical event recall has the potential to access aspects of learning and tutoring processes that are not directly available in discussion transcripts. Furthermore, this tool can complement content analysis in an important way by using its results to probe 'the thinking behind the text' in collaborative work within learning communities in networked environments. In future studies we will report on the use of critical event recall among all the participants in an online workshop, and on the combination of content analysis, critical event recall and social network analysis (not used in the present study) to the same workshop. The aim of this work is to move toward a more complete understanding of the complexities of praxis in online learning communities through a conversation with theory. It is our hope, in this task, to contribute to the development of praxis, and to the enriching of our theoretical and methodological tools. This paper does not report a theoretical synthesis of the frameworks upon which we have drawn. This is a communal endeavor that will require many more conversations.

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## Note

1. Actions that result from the deliberate application of theory or are entailed by a particular theoretical structure.

## Appendices

### Appendix 1. Veldhuis-Diermanse schema for learning processes coding

Code	Cognitive learning activities
	<i>Debating</i>
CDPF	<ul style="list-style-type: none"> <li>● A problem, solution or idea is presented. This contribution is followed by an illustration or argumentation</li> </ul> <p>“These crops are very suitable for the field. One restriction is that these crops (certainly potatoes) can be grown only once every 4 or more years, because of diseases. It is not good to grow potatoes and sugar beets in a sequence, either. So they should be separated by another crop.”</p>
CDPNF	<ul style="list-style-type: none"> <li>● A problem, solution or idea is presented. This contribution is <i>not</i> followed by an illustration or argumentation</li> </ul> <p>“The best research procedure would be watershed level (<math>i + 3</math>) with the use of simple comprehensive methods.”</p>
CDAF	<ul style="list-style-type: none"> <li>● A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is followed by a backing, refutation or restriction</li> </ul> <p>“I agree that Income Optimization is not an easy term, though I think it’s quite right here. A cognitive map only gives an overview of the problems to make things clearer. All influences concerning agriculture will affect the income of the farmers.”</p>
CDANF	<ul style="list-style-type: none"> <li>● A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is <i>not</i> followed by a backing, refutation or restriction</li> </ul> <p>“I like the idea!”</p>
CDAQ	<ul style="list-style-type: none"> <li>● Asking a content-directed question</li> </ul> <p>“In that school the aim is diagnostic testing. What does that mean to the students? Is it not necessary for them to be coached? And what sort of coaching? Are these tests serious?”</p>
	<i>Using external information and experiences</i>
CCEI	<ul style="list-style-type: none"> <li>● Contributing new information found in other information sources (mentioned or not) than the discourse</li> </ul> <p>“Yields according to Wofost when using sowing dates as mentioned in the CIM: potatoes – very high (15,847 kg/acre), winter wheat – low (7,653 kg/acre), sugar beets – very high (14,293 kg/acre).”</p>

## Appendix 1. (continued)

Code	Cognitive learning activities (cont.)
CREI	<ul style="list-style-type: none"> <li>● Referring to information found in other information sources (mentioned or not) than the discourse</li> </ul> <p>"I found an interesting site: <a href="http://www.sainsbury.co.uk/gm/">http://www.sainsbury.co.uk/gm/</a>"</p>
CSEI	<ul style="list-style-type: none"> <li>● Summarizing or evaluating the information found in other information sources (mentioned or not) than the discourse</li> </ul> <p>"Summarizing: A LUT is sustainable if it is ecologically possible, economically viable and socially acceptable. The three characteristics of a LUT distinguished in the article are ..."</p>
CREE	<ul style="list-style-type: none"> <li>● Referring to earlier experiences (scholastic or daily)/Referring to outcomes of running a model</li> </ul> <p>"In Germany farmers told me that rape seed is grown on fallow fields. The legislation (15% fallow) allows rape seed."</p>
<i>Linking or repeating internal information</i>	
CIL	<ul style="list-style-type: none"> <li>● Linking facts, ideas or remarks presented in the discourse/Referring explicitly to a contribution in the discourse</li> </ul> <p>"I found results similar to those of Eesge and Ries."</p>
CIR	<ul style="list-style-type: none"> <li>● Repeating information without drawing a conclusion or interpreting that information</li> </ul> <p>"In approach 1 land units are derived from extensive soil sampling and Remote Sensing. Four functional layers are distinguished and combined to soil profiles. Two land units are distinguished: one with a mainly sandy texture, one more clayey." (= note 34)</p>
Code	Affective learning activities
AM	<ul style="list-style-type: none"> <li>● General: reacting emotionally to notes of fellow-students, without directly reacting to the content of that note. This reaction can be <i>positive</i>, <i>negative</i> or <i>neutral</i></li> </ul> <p>"It is a very interesting and mainly correct map ..."</p>
AA	<ul style="list-style-type: none"> <li>● Asking for (general) feedback, responses or opinions by fellow-students</li> </ul> <p>"What is your opinion about my minor case?"</p>
AC	<ul style="list-style-type: none"> <li>● 'Chatting' or 'social talks'; contributions that are not relevant to solve the case/task</li> </ul> <p>"Anton, Happy birthday!"</p>
Code	Metacognitive learning activities
<i>Planning</i>	
MPA	<ul style="list-style-type: none"> <li>● Presenting an approach or procedure to carry out the task</li> </ul> <p>"I think we can take the report as point of departure to write our policy note."</p>
MAA	<ul style="list-style-type: none"> <li>● Asking for an approach or procedure to carry out the task</li> </ul> <p>"I read a lot of articles, but I do not know if it was useful. Summarized: it is non-organic and better to the milieu. It is possible to acquire it synthetically, but it can also be found in nature. Is this wasting time or shall I search for more information?"</p>
MEA	<ul style="list-style-type: none"> <li>● Explaining or summarizing the approach already adopted</li> </ul> <p>"After reading the article 'Dewey's Problem' I went back to my notes on the online document given above. There are several comments that Dewey makes there that bear on CSILE, and I thought that I would share them. I'll post my thoughts on the article separately."</p>
<i>Keeping clarity</i>	
MSD	<ul style="list-style-type: none"> <li>● Structuring the contributions in the database</li> </ul> <p>"I think note 45 is related strongly to note 67 and 89. So, I replaced the note."</p>

*Appendix 1. (continued)*

Code	Metacognitive learning activities (cont.)
MAC	<ul style="list-style-type: none"> <li>● Asking for an explanation, clarification or illustration as a reaction to a certain note</li> </ul> <p>“I don’t understand how you are able to discriminate sandy and clayey soil from the CESAR image. Can you explain how to do that?”</p>
MGE	<ul style="list-style-type: none"> <li>● Explaining unclear information in notes; answering a question asked by another participant</li> </ul> <p>“Legislation and the farming policy have a positive influence on the problem of leaching. That is what is meant with the +.”</p>
<i>Monitoring</i>	
MKW	<ul style="list-style-type: none"> <li>● Monitoring the original planning, aim etc.</li> </ul> <p>“It is very unclear to me. What is the aim of this course? What do have we to do?”</p>
MRP	<ul style="list-style-type: none"> <li>● Reflecting on one’s own actions or on certain contributions to the database</li> </ul> <p>“I notice some confusion about the meaning of + and – in the cognitive map.”</p>
Code	Rest activities
RNE	<ul style="list-style-type: none"> <li>● Units that cannot be decoded by using the categories above</li> </ul> <p>“*\$#@%#&amp;#@. My computer crashed again and I was just going to save my note! I will stop, tomorrow try again ...”</p>

Source: Veldhuis-Diermanse (2002)

*Appendix 2. Anderson Schema for tutoring processes coding*

Instructional design and organization	
<i>Indicators</i>	<i>Examples</i>
<ul style="list-style-type: none"> <li>● Setting curriculum</li> <li>● Designing methods</li> </ul>	<ul style="list-style-type: none"> <li>● “This week we will be discussing ...”</li> <li>● “I am going to divide you into groups, and you will debate ...”</li> </ul>
<ul style="list-style-type: none"> <li>● Establishing time parameters</li> <li>● Utilizing medium effectively</li> </ul>	<ul style="list-style-type: none"> <li>● “Please post a message by Friday ...”</li> <li>● “Try to address issues that others have raised when you post.”</li> </ul>
<ul style="list-style-type: none"> <li>● Establishing netiquette</li> <li>● Making macro-level comments about course content</li> </ul>	<ul style="list-style-type: none"> <li>● “Keep your messages short.”</li> <li>● “This discussion is intended to give you a broad set of tools/skills which you will be able to use in deciding when and how to use different research techniques.”</li> </ul>
Facilitating discourse	
<i>Indicators</i>	<i>Examples</i>
<ul style="list-style-type: none"> <li>● Identifying areas of agreement/disagreement</li> </ul>	<ul style="list-style-type: none"> <li>● “Joe, Mary has provided a compelling counter-example to your hypothesis. Would you care to respond?”</li> </ul>
<ul style="list-style-type: none"> <li>● Seeking to reach consensus/understanding</li> </ul>	<ul style="list-style-type: none"> <li>● “I think Joe and Mary are saying essentially the same thing.”</li> </ul>
<ul style="list-style-type: none"> <li>● Encouraging, acknowledging, or reinforcing student contributions</li> </ul>	<ul style="list-style-type: none"> <li>● “Thank you for your insightful comments.”</li> </ul>
<ul style="list-style-type: none"> <li>● Setting climate for learning</li> </ul>	<ul style="list-style-type: none"> <li>● “Don’t feel self-conscious about thinking out loud on the forum. This is a place to try out ideas after all</li> </ul>
<ul style="list-style-type: none"> <li>● Drawing in participants, prompting discussion</li> </ul>	<ul style="list-style-type: none"> <li>● “Any thoughts on this issue?”</li> </ul>
<ul style="list-style-type: none"> <li>● Assess the efficacy of the process</li> </ul>	<ul style="list-style-type: none"> <li>● “I think we’re getting a little of track here.”</li> </ul>

## Appendix 2. (continued)

Direct instruction	
<i>Indicators examples</i>	
● Present content/questions	● "Bates says . . . what do you think?"
● Focus the discussion on specific issues	● "I think that's a dead end. I would ask you to consider . . ."
● Summarize the discussion	● "The original question was . . . Joe said . . . Mary said . . . We concluded that . . . We still haven't addressed."
● Confirm understanding through assessment and explanatory feedback	● "You're close, but you didn't account for . . . this is important because."
● Diagnose misconceptions	● "Remember, Bates is speaking from an administrative perspective, so be careful when you say . . ."
● Inject knowledge from diverse sources, e.g., textbook, articles, Internet, personal experiences	● "I was at a conference with Bates once, and he said . . . You can find the proceedings from the conference at <a href="http://www...">http://www . . .</a> "
● Responding to technical concerns	● "If you want to include a hyperlink in your message, you have to . . ."

Source: Anderson et al. (2000)

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## Chapter 3

### A methodological framework for practice-based research in networked learning

PHILIPPA LEVY

**Abstract.** This paper presents a methodological framework for practice-based research in the field of networked learning, based on the author's approach to carrying out a case study evaluation of a networked professional development initiative for information services staff in higher education. The theoretical case for the framework is made with reference to principles associated with constructivist programme evaluation as well as with interpretivist and critical traditions in action research. The purposes and politics of this approach, and the question of validation criteria for claims about its effectiveness for building theory, as well as for evaluating and improving practice, are discussed. Issues to do with using computer-mediated communication as a medium for participatory research are also raised. An overview is given of the way this research approach was implemented in practice (including the use of a combination of online and face-to-face data collection methods) and some methodological issues that arose in the course of carrying it out are highlighted. The paper concludes by suggesting that as a methodology for evaluating, theorizing and improving practice, 'networked action research' also offers an approach to pedagogical design, most obviously in the context of networked professional development for educators and learner support staff.

**Keywords:** action research, case study, computer-mediated communication, constructivism, evaluation, networked learning

### Introduction

Action research is a type of inquiry that is carried out through and within social action by those involved, rather than on it (or them) from an external vantage point. It is a well-established, practice-based approach to developing educational practice and theory that is closely connected with the 'reflective practitioner' tradition in professional development (Schon, 1983), although it is not uncontroversial (Zeichner, 2001) and it can take a variety of forms. Recently, it has begun to be used within the emerging field of networked learning in higher education, as a means of evaluating new initiatives and of developing validated conceptual models that can be used as a resource by educational practitioners working in similar settings with similar purposes (e.g., Salmon, 2002). As yet, however, there have been few detailed accounts of how this methodology is being applied in this context. There also has been

little discussion of paradigmatic issues, and issues associated with research design and methods, that would seem to be particularly salient in a field that has been strongly influenced by ideas associated with the educational philosophy of constructivism, and with collaborative learning (Jones, Asensio & Goodyear, 2001). Issues to do with constructivism as a research perspective, and with using computer-mediated communication (CMC) as a medium for participatory research, are perhaps of particular relevance here.

Against this background, this paper presents a methodological framework for practice-based research in networked learning, based on an approach to carrying out an in-depth, case study evaluation of a networked professional development course that, as a university teacher, I developed and implemented with colleagues for information services staff in higher education. The course was part of a programme of activities offered by NetLinkS, a project funded by the Joint Information Systems Committee of the United Kingdom's Higher Education Funding Councils. The project had a national remit to research and promote the roles of information specialists in networked learner support (see Levy, 2002). The course ran for seventeen weeks in 1997–1998 with participants from more than thirty UK higher education institutions, with the aim of providing an opportunity for learner support staff to engage with ideas and issues associated with their changing educational roles in the networked environment, as well as to develop new technical expertise. A number of themes – educational, professional, organizational and technological – were selected to provide the focus for learning activities. However, the course was not designed to transmit a particular body of content; instead, it was conceived as a flexible resource framework, or environment, within which practitioners would be able to explore ideas and develop skills of most relevance to their professional and learning purposes. The pedagogic model for the course was developed with reference to constructivist perspectives on learning (e.g., Grabinger & Dunlap, 1995), and with the aim of supporting self-managed, collaborative learning in what was for all participants a new type of learning environment. There was a strong emphasis on developing new perspectives and expertise within a 'virtual' learning community, through online discussion, group-work and developing work-based projects with peer support, and on learning experientially about networked learning. Using the experiential learning cycle as a design framework (Kolb, 1984), a series of developmental tasks focusing on the experience and practice of networked learning, and involving critical reflection and discussion, were embedded into the course, and a portfolio approach to recording learning was encouraged. Access was entirely online – there were no face-to-face meetings – and the technical platform was an early experiment in virtual learning environment (VLE) design, in that the Web and a range

of asynchronous and synchronous conferencing tools were used to provide integrated access to social and information resources (see Levy, 1999).

As a methodological tradition, action research is subject to the influence of changing perspectives in social theory and inquiry. At the same time, the networked environment offers new possibilities for carrying out research, for example through participant observation and interviewing within the on-line environment, and content analysis of text-based, online exchanges (e.g., Henri, 1992; Hine, 2000; Mann & Stewart, 2000). In the case of my project, I used a combination of online and face-to-face methods for data collection and designed the research approach with reference to recent developments in constructivist programme evaluation as well as to interpretivist and critical traditions in action research and some aspects of post-modern thought. Engaging with methodological issues was a developmental process rather than a 'once and for all' step at the outset when the over-arching framework was decided upon. As the research evolved through a number of cycles of planning, implementation and reflection, and as I revisited the methodology literature from time to time, I was able to clarify my standpoint within the landscape of qualitative inquiry. In doing so, I came to identify my project as an initiative in 'networked action research', drawing on and blending related methodological perspectives and approaches to fit the circumstances and purposes of my project. Whilst it is sometimes suggested that by definition, evaluation research and action research are fundamentally different (e.g., McNiff, Lomax & Whitehead, 1996), the methodological framework presented here can be seen as a hybrid of both.

In what follows, my aim is to give a flavor of what this has meant in both philosophical and practical terms. The paper situates my project within the context of salient methodological traditions and then describes its overall framework and methods, highlighting some methodological issues that arose during the research. I focus in particular on questions to do with:

- the purposes and politics of my research (i.e., the kind of knowledge that I aimed to produce, and the rationale for, and nature of, the project's participatory dimension);
- aspects of constructivist epistemology and their practical implications (i.e., as regards subjectivity; reflexivity; the nature of the 'research relationship' between participants; 'case' (re)construction as a means of knowledge-construction);
- the different phases of the research cycle, and methods used for data collection and analysis (including iterations of both online and off-line reflective dialog; content analysis of online interactions; the process of constructing 'thick' case description);
- decisions taken about representation as regards the case narrative;

- validation criteria for the research approach, and the basis of claims that might be made about its effectiveness as a means not only of evaluating and improving practice but of building theory.

## Action research

Carrying out action research in the context of educational practice implies a particular philosophical and political stance in relation to knowledge and knowledge construction. Recognizing the uniqueness and complexity of specific educational situations, action researchers assume that professional competence is more than just a matter of routinely applying universal rules of practice or purely technical know-how prescribed by some external source of guidance. Instead, competence is taken to be a matter of being able to perceive, and take forward, the right course of action when in a particular situation (Schon, 1983); it is based on knowledge that is embedded in personal experience and that is essentially concrete, context-specific and open to re-interpretation. At the same time, it is seen as both appropriate and necessary that educational practitioners participate actively in developing the knowledge that relates to, and guides, their practice. In the light of these considerations, action research therefore does not aspire to the construction of propositional knowledge (*episteme*), or to the production of purely technical know-how. Instead, the aim is to construct validated, 'practical' knowledge (the Aristotelian concept of *phronesis*) through critical analysis of specific educational situations within the context of action – that is, through *praxis* (Grundy, 1982; see De Laat & Lally 2004). This is seen as a dialectical process that is constitutive of effective action *and* new knowledge:

To be action research, there must be praxis rather than practice. Praxis is informed, committed action that gives rise to knowledge rather than just successful action. It is informed because other people's views are taken into account. It is committed and intentional in terms of values that have been examined and can be argued. It leads to knowledge from and about educational practice (McNiff, Lomax & Whitehead, 1996, p. 8).

The emphasis on practical knowledge within this paradigm does not, as Usher, Bryant and Johnston (1997, p. 128) comment, mean that scientific knowledge has nothing to do with practice: practical knowledge "*may involve general or universal knowledge, but by being contextually mediated it becomes particularised*". The same might be said for technical know-how. Nor does this emphasis diminish the theoretical dimension of action research. On the contrary, whilst action research is concerned essentially with improving practices and situations (Carr & Kemmis, 1986; Parker, 1997), theory building is an

integral aspect of constructing practical knowledge through praxis. The form of theory generated through action research has been called 'living theory' (McNiff, Lomax & Whitehead, 1996); by sharing this with colleagues, typically through case studies, practitioner-researchers aim to contribute to their professional community's body of knowledge. However, access to vicarious experience via case studies is not seen as an adequate substitute for personal involvement in practice-based research, and action researchers caution against using case studies in ways that make universalizing claims (e.g., Whitehead, 1993). This serves as a reminder that my own project has not been an effort to develop a general educational theory or model (or indeed a research approach) with a claim to universal applicability. My assumption is that other networked learning practitioners, like me, will use personal judgment to develop approaches that are right for them and their own circumstances. At the same time, the 'living theory' produced through my research may be relevant to others with similar purposes.

In terms of methodology, educational action research is grounded in interpretive and reflective practice. Practitioner-researchers investigate and evaluate educational situations inductively, looking critically at their own educational assumptions, values, aims and actions in relation to the perspectives of participants in their programmes. What is meant by reflective practice in the literature varies considerably, to the extent that it can be seen as a catch-all term embracing epistemological and ideological positions that are incompatible (Brookfield, 1995). There is a particular tension between the liberal humanist perspective that is associated with Schon's (1983) work and the more politicized perspective of the critical theory tradition (e.g., Winter, 1989). Nevertheless, it is clear that essentially, the idea of reflective practice implies an effort to become more aware of the tacit knowledge that is an inevitable element of individual practice (Polanyi, 1969; Rowland, 1993) and a commitment to examine critically – and perhaps abandon – those personal 'theories-in-use' (Schon, 1983) that shape what practitioners actually do.

It is often recommended that action researchers keep a research journal as a vehicle for documenting and reflecting systematically on the action that is the subject of their inquiry, and that they participate in reflective dialog, for example with a 'critical friend' whose role is both to challenge and support them in moving toward new understandings. Many also are committed to engaging critically with the impact of structural and ideological pressures on their professional practice and understandings. In the context of networked learning, this might include considering the implications of increasing globalization and commercialization in higher education, and of the instrumentalist and managerialist agendas that are discernible in much discussion about new educational applications of technology. A number of recent papers call for

a more critical response from networked learning practitioners to both the priorities of the public policy agenda that is driving the diffusion of ICTs in teaching and learning *and* to the communitarian and democratic assumptions of liberal educational discourses in this field (e.g., Jones, 2002; Hodgson & Reynolds, 2002).

Interpretation and reflection in action research typically take place within the framework of the action research cycle – a systematic, problem-solving sequence of steps involving planning, acting, observing and reflecting, using both qualitative and quantitative methods for investigating stakeholder perspectives. A strong participatory ethos often underpins research design. The research cycle also can be understood as a process of experiential learning, in which concrete experiences provide the basis for observation, critical reflection, theory building and the application and testing of new understandings in new situations (e.g., Burge, 1996). Kolb's (1984, p. 38) definition of experiential learning as *"the process whereby knowledge is created through the transformation of experience"* could apply equally well to action research.

### **A constructivist viewpoint**

The action research cycle offers a widely accepted framework for understanding and engaging systematically in practical knowledge construction. At the same time, commentators have discerned a tendency for action researchers to gloss over the complexities of both the philosophical and procedural aspects of the research process (e.g., Lincoln, 2001; Zeichner, 2001; Zuber-Skerritt, 1996). For example, from a constructivist standpoint,<sup>1</sup> issues arise in relation to subjectivity and reflexivity in the social construction of knowledge that have implications for research practice in areas such as data collection and analysis, the research relationship between stakeholders, textual representation and knowledge validation. A number of strands in the wider field of qualitative inquiry provide guidance in these areas, and I found Guba and Lincoln's (1989) constructivist evaluation perspective particularly relevant for the purposes of my project: it offers a very explicit methodological framework, grounded in the epistemology of social constructivism. There are clear points of convergence between this evaluation framework and some forms of action research (Lincoln, 2001; Lincoln & Guba, 2000). Nevertheless, important differences in emphasis remain. In particular, whilst an increasingly action-oriented turn is evident in on-going formulations of this approach to constructivist inquiry, it is committed *"principally to knowledge generation, rather than social change"* (Lincoln, 2001, p. 129).

Constructivist epistemology rests on the assumption that people construct meaning actively within situated contexts of social interaction, involving a



complex range of factors such as language, history and ideology. Therefore, as Schwandt (1994) explains, understandings that at first sight might appear to be self-evident and unproblematic – for example, about what is meant by ‘woman’, ‘man’, ‘self’, ‘learner’, ‘education’, ‘truth’ – are revealed to be the products of complicated discursive, socially constructed practices. At the same time, multiple and sometimes conflicting or competing constructions may exist in any particular context – such as a networked learning programme. The focus of constructivist evaluation research is therefore on illuminating constructed meanings (understandings) within a specific social context, from multiple points of view (Greene, 2000), with the goal of reaching better understandings of shared experiences. Improved understandings in this context are defined in terms of ‘the best informed views on which there are agreements’ (Lincoln & Guba, 2000) or, from a related perspective, ‘community consensus’ (Heron & Reason, 1997), rather than ‘truths’ in an absolute sense. However, the emphasis on consensus does not mean that the question of difference is ignored, and for philosophical, ethical and practical reasons this approach attaches great importance to inclusive representation of all stakeholder perspectives in an evaluation project. In the case of my own research, my aim has been to adopt an inclusive approach to exploring the possibility – or impossibility – of consensus on issues arising from participation in the course, and this exploration, combined with my own critical reflection, provides the basis for the conclusions that are drawn. My focus has been on constructions of learning and teaching within a specific networked learning environment, and in how those involved (myself included) interpreted their experiences in relation to their own, and the programme’s, purposes.

Similar epistemological assumptions to those outlined above underpin constructivist perspectives on learning. There is no universally accepted form of educational constructivism, differences of viewpoint amongst theorists and practitioners being evident in the realm of high-level philosophy and in matters of pedagogy and politics. For example, different approaches place somewhat different amounts of emphasis on individual cognition and the social dimension of learning, and on questions of learner empowerment. However, the view that learning is essentially an active, situated and relational (or social) process is widely shared. In practice, this leads to a commitment to participatory and dialogic approaches to learning design and facilitation, including an interest in facilitating participation in learning communities, or in knowledge-building communities of practice (Lave & Wenger, 1998; Tennant, 1997). Opportunities for ‘learning conversations’ are prioritized, whether the focus is more on learner–tutor interaction (e.g., Laurillard, 2001) or on co-

operative feedback and debate amongst peers (e.g., McConnell, 2000). Principles relating to participation and dialog are equally important in constructivist research methodology, some elements of which are reviewed briefly below.

### *Reflexive practice*

The constructivist paradigm assumes that (constructed) subjectivity is central to the research process: researchers make sense of what they observe through the interaction between their own 'interpretive framework' and those of others, and are inevitably "*part of the setting, context and social phenomena they seek to understand*" (Schwandt, 1997, p. 136). Within this context, the inherent reflexivity of interpretive practice becomes apparent (Winter, 1989; Usher, 1996). Hence the emphasis in constructivist methodology on 'reflexive practice' – what Heron and Reason (1997, p. 282) call "*self-reflexive attention to the ground on which one is standing*" – not in order to suspend subjectivity, but to use the researcher's personal interpretive framework consciously as the basis for developing new understandings. (It is perhaps worth highlighting the distinction drawn here between 'reflexive' and 'reflective' practice, the former being used to refer to the attempt to address the implications of the hermeneutics of research practice, and the latter to refer to the activity of critiquing personal, professional activity and understandings.) It is accepted that there are elements of any researcher's interpretive framework that will resist both fixity and identification (Usher, 1996). In general, however, reflexive practice can be said to involve explicit critical examination of the research process – for example, in terms of the researcher's 'working hypotheses', motivations and status within the social context – as a means of illuminating how these factors contribute to the research process and outcome. The structural role of power in the relationship between researcher and researched is one issue that arises here; as Hollway (1989) notes, accounts of experience and viewpoint are always inflected by contextual factors that include power relations:

People's accounts are always contingent: upon available time and discourses ... upon the relationships within which accounts are produced and upon the context of events recounted; upon power and the defenses in operation against formulating different versions because of their self-threatening implications (Hollway, 1989, p. 39).

One obvious structural dimension of the research relationship between myself and other participants in my project was my status as course leader, referred to in retrospect – albeit humorously – by one participant when she characterized me as "[like] *the Vice-Chancellor – you were in charge!*"

An issue arises here in relation to what Yates (1997) has called the ‘democratic theory’ of CMC – that is, the claims that have been made within both the educational and organizational literatures about the democratizing impact on social relations of using text-based CMC. For example, it has been suggested that reduced ‘social presence’ in asynchronous interactions online, along with a number of other characteristics of the medium, will lead to greater equity in gender relations; a similar argument has been advanced to suggest that the balance of power between tutors and participants may be expected to shift in favor of the learner in educational settings online (e.g., Garrison, 1997). This link between CMC and more egalitarian forms of social interaction might seem to imply that the online environment will offer particular advantages for facilitating constructivist and participatory approaches to research into networked learning and teaching. On the other hand, there is a growing body of research that, in pointing to the significant role played by pre-existing social categories and norms in the construction of social presence and identity in online settings, challenges the claims of the democratic theory as overly deterministic. For example, gendered styles of discourse found in face-to-face discussions – such as ‘report’ and ‘rapport’ talk (Tannen, 1991) – have been identified in online interactions (e.g., Herring, 1996; Hodgson, 2002), and more powerful network participants have been shown to exert a significant influence on the behaviors and attitudes of others (e.g., Mantovani, 1994). Therefore, whilst I aimed to encourage inclusivity in online learning/research discussions during my project, and to minimize the effects of status in the research relationship, I did not assume that achieving this could be taken for granted any more than in a face-to-face setting.

### *Dialog and debate*

Guba and Lincoln’s (1989) constructivist evaluation methodology is dialogical in its approach for both epistemological and ethical reasons. In procedural terms, the emphasis is on cycles of dialogical interaction in which all participants – not only the researcher – are exposed to each others’ viewpoints in order to reach deeper understandings through critical engagement with multiple perspectives. Issues raised in one iteration are followed up in successive iterations until consensus, consensuses, or the impossibility of consensus, has been established. Openness about contrasting perspectives, including the researcher’s own intentions and perspectives, is important here for both ethical and practical reasons, since withholding information or views is taken to limit the potential for joint construction of meaning. This approach is seen as dialectical in that the researcher’s *and* other participants’ beliefs, preconceptions and practices may be challenged and changed through the research.

In my project, I aimed to engage participants in the type of reflective and analytical approaches to discussion that researchers into 'constructive' approaches to learning have called 'real' – as opposed to 'didactic' – talk:

... in didactic talk, each participant may report experience, but there is no attempt among participants to join together to arrive at some new understanding. 'Really talking' requires careful listening; it implies a mutually shared agreement that together you are creating the optimum setting so that half-baked ideas can grow. 'Real talk' reaches deep into the experience of each participant; it also draws on the analytical abilities of each (Belenky et al., 1986, p. 144).

Again, an issue arises here in relation to CMC as a research medium: what is the potential for engaging in 'real talk' at a distance and via a mode of communication that stands somewhere between writing and speaking (Yates, 1996)? On the one hand, asynchronous CMC is widely seen as especially suited to supporting reflective, analytical approaches to interaction – perhaps with advantages over face-to-face interaction in this respect – and therefore has a strong appeal in the context of constructivist perspectives on learning (e.g., Harasim et al., 1995; Hiltz, 1994; Mason & Kaye, 1989; McConnell, 2000; Motterham & Teague, 2000; Salmon, 2000). It also has been suggested that computer-conferencing is particularly valuable for supporting discussion of concrete experiences and problems within professional development programmes (Bonamy & Haugluslaine-Charlier, 1995) and for promoting critical reflection on interpersonal relations in the learning process (Asensio, Hodgson & Trehan, 2000). Synchronous text-based 'chat' offers potential for more spontaneous forms of online learning interaction, such as rapid question-and-answer and brainstorming (Murphy & Collins, 1997). On the other hand, it is not unusual for learners to experience a high psychological threshold to participation in CMC-based learning interactions, as well as a range of logistical barriers, and these factors can affect both their willingness to enter discussions and their capacity to find a comfortable means of self-expression (e.g., Goodyear, 2001; Hammond, 2000). I was aware that participants in this research might be new to using CMC for learning purposes, and assumed that tutors' roles would be important in establishing a climate and conventions that would be conducive to 'real talk' in learning/research interactions.

### *Case (re)Construction*

The effort to (re)construct shared experience as a case is a key aspect of both the process and product of constructivist inquiry. Case study accounts are

viewed as co-constructed by the researcher and other participants through dialogical interactions and other strategies such as ‘member-checking’, whereby all stakeholders view and have input into drafts of the case study itself. In that participants in my project agreed to co-operate with an action research agenda which was not theirs but was shaped by their professional and learning concerns, as well as my own interests, and was carried out using the kind of iterative approach to data collection and analysis outlined above, it is possible to advance the claim that this research was participatory and the resulting case study co-constructed. Nevertheless, my approach falls some way short of more radical positions on collaboration in inquiry in which it is advocated that all participants have the status of both co-researcher and co-subject, with an equal role in determining and implementing research focus, design and analysis (e.g., Heron & Reason, 1997).

A number of practical challenges arise in relation to constructing case studies from this standpoint. For example, ‘thick’ contextual description in the ethnographic sense is taken to be essential – as Schwandt (1997) comments, it is interpretive texture, rather than level of detail, that matters:

to thickly describe social action is to begin to interpret it by recording the circumstances, meanings, intentions, strategies, motivations, and so on that characterise a particular episode. It is this interpretive characteristic of description rather than detail that makes it thick (Schwandt, 1997, p. 161).

At the same time, there is the question of realism and authority in representation. Narrative realism, the traditional mode of academic writing, presents itself as a neutral vehicle for conveying the truth, appealing directly to the reader’s ‘willing suspension of disbelief’. Yet the work of ethnographers in particular has demonstrated that literary and research genres have more in common with each other than traditionally has been acknowledged, in that texts do not straightforwardly report reality but contribute to the process of reality-construction (e.g., Hammersley, 1992). Moreover, it has been argued that traditional forms of research writing implicitly maintain the researcher’s position of control by failing to draw attention to the transactional dimension of interpretation and the question of power relations between researcher and researched (Schwandt, 1997).

Therefore, whilst Guba and Lincoln (1989) emphasize that ‘grounded case construction’ should reflect all perspectives clearly and offer interpretation that is credible and relevant to all participants in the study, it might be argued that it should aim also to present the ‘story’ in a way that challenges the powerful appeal of the text to realism and authority. As Stake (1994) points out:

Even though committed to empathy and multiple realities, it is the researcher who decides what is the case's own story, or at least what of the case's own story he or she will report ... This is not to dismiss the aim of finding the story that best represents the case, but to remind that the criteria of representation ultimately are decided by the researcher (Stake, 1994, p. 240).

### *Validation*

Knowledge that is produced through constructivist evaluation, as through action research, is conceived as 'working' knowledge that is provisional in the sense that it is amenable to re-interpretation. Nevertheless, Guba and Lincoln (1989, p. 143) emphasize that constructivist sense-making is subject to validation and interpretations may be judged problematic if "*incomplete, simplistic, uninformed, internally inconsistent, or derived by an inadequate methodology*". The view that positivist validation criteria are not meaningful in the context of the constructivist paradigm is evident in on-going reformulations of their influential 'trustworthiness' standards for naturalistic inquiry (Lincoln & Guba, 1985). These correspond broadly to positivist standards of internal and external validity, reliability and objectivity, and are concerned primarily with questions of interpretive accuracy and the quality of the research as a product. The more recent 'authenticity' criteria seem more in tune with the philosophical assumptions of the constructivist paradigm (Rodwell & Byers, 1997), in that they prioritize issues to do with process rather than product – issues such as thoroughness, fairness, reflexivity, sharing learning from the research with stakeholders, and linking evaluation to concrete action outcomes. From this perspective, procedures like 'member checking' and triangulation are seen as matters of ethical and methodological accountability rather than of seeking ultimate reality in interpretation. Lincoln (1995) suggests that putting constructivist validation criteria into practice means ensuring throughout the evaluation research process that attention is paid to issues such as diversity within the participant group, equality of opportunity to contribute to the research, and its relevance in relation to meaningful action. However, the question of verification criteria for constructivist inquiry is not easy to resolve and some commentators argue that it is helpful to treat emerging standards and procedures as considerations rather than prescriptive directions (e.g., Manning, 1997). A pragmatic view on this is taken by Creswell (1998) who recommends that trustworthiness and the newer, authenticity criteria are both useful for establishing the credibility of research within this paradigm.

In the context of evaluating networked learning programmes, the constructivist perspective on validation implies that claims about learning having taken place, or about pedagogic effectiveness, might be difficult to make on either epistemological or ethical grounds if based solely on content analysis of ‘learning interactions’. This is not to deny that meaningful issues and processes in the dynamics of online learning can be addressed by means of content analysis – although, as suggested by De Laat and Lally (2004), this approach is perhaps especially valid when used in combination with other methods – but to emphasize the paradigmatic commitment of the approach described in this paper to grounding research in the interpretive perspectives of all stakeholders.

## Research design and methods

This part of the paper turns to some of the practical details of my project design and methods. Figure 1 represents the action research cycle that I have followed in terms of four main phases, each of which is described briefly below (the research is still in progress – Phases 3 and 4). In adapting the classic ‘plan, act, monitor, reflect’ problem-solving cycle to highlight processes associated with knowledge construction, the diagram aims to reflect the way in which I have combined ideas from constructivist inquiry and action research for this project. Of course, the cycle as represented here provides only a rough approximation of what is an essentially non-linear experience. In particular,

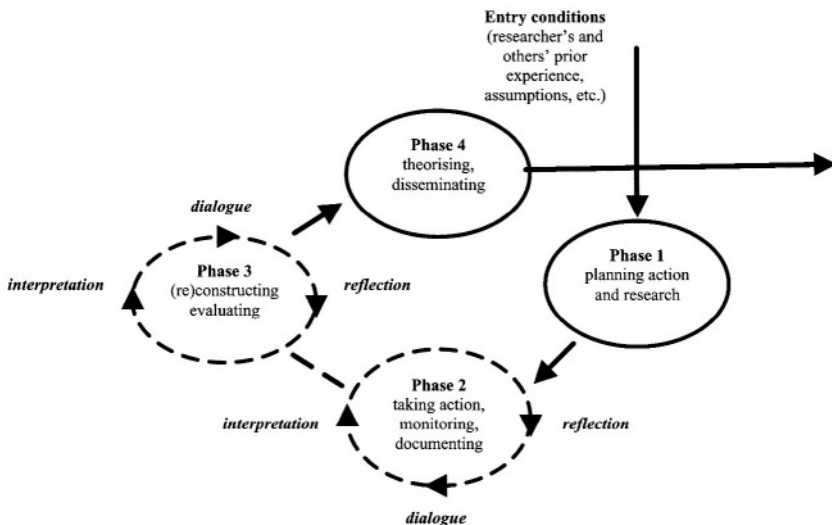


Figure 1. Constructivist action research cycle.

(re)construction of social action as a case can be seen as an emergent and participative process, encompassing cycles of data collection and analysis as well as the writing of the narrative account. The (re)construction of the case in Phase 3 therefore could be said to have begun during the action phase of the project in Phase 2. The diagram suggests the iterative, participatory dimension of these Phases, and the close connection between them.

Action research projects often are designed to include more than one iteration of a problem-solving cycle, with the learning from the first iteration being applied and tested empirically within the researcher's practice in the second; this enables validation of the researcher's claims about improving practice, in addition to claims about improving understanding. The project described here consists of one cycle only, with theoretical and learning outcomes that are subject to validation by criteria suggested above. At the same time, however, this cycle extends back as well as forward in time, building on my previous action research related to networked learning (e.g., Fowell & Levy, 1995a) and explicitly encompassing action planning for my future practice and research.

### *Phase 1: Planning action and research*

This phase involved the following steps:

- *Developing the research approach*, including starting a research journal and establishing an arrangement with a 'critical friend' to observe the action and support my reflective practice throughout the project.
- *Investigating my field of action*, i.e., information specialists' professional development needs, interests and circumstances in relation to networked learner support. I needed to increase my understanding of current trends and issues in networked learning and learner support, and to explore practitioners' responses to the way in which I and colleagues had begun to conceptualize both the role for information specialists in networked learner support and the model for online professional development (e.g., Fowell & Levy, 1995b). This was done through NetLinkS project activities such as focus groups and online conferences, as well as by personal desk research.
- *Designing pedagogic and technical models*: I gained feedback on the draft course design via interviews with a small sample of learner support practitioners from a variety of learner support settings, and a technical pilot of the course environment was carried out.
- *Establishing a preliminary idea of participants' 'entry conditions' as regards research and course participation*, using a pre-course questionnaire to elicit information about prior experiences of online learning, and



about the technical and practical aspects of their planned involvement in the course.

*Phase 2: Taking action – monitoring, reflecting, documenting*

During this phase I focused on monitoring and documenting the social action of which I was part, using my research journal to note observations, questions and action-decisions. My aim was to gain an understanding of participation on the course from multiple perspectives and, in accordance with the principle of ‘responsive focusing’ in constructivist programme evaluation, to identify concerns and issues to be explored in further iterations of the research. I aimed to be alert to contrasting perspectives, as well as to areas in which consensus might emerge. The phase involved:

- *Establishing the participative framework for the research*, including discussing the project with participants, gaining permission to use online transcripts in data analysis, establishing confidentiality standards, and so on.
- *Carrying out participant observation within the learning environment*. My focus was on the asynchronous and synchronous online interactions that took place in public forums and in my own learning group’s forums. Online interactions were archived automatically by the conferencing systems, and could be printed as transcripts. I did not adopt a pre-established framework for interaction analysis but analyzed the characteristics, content and frequency of discussions inductively in the context of different learning activities, and noted emergent concepts and themes.
- *Cycles of online ‘stakeholder’ dialog and debate*. Some learning tasks were designed specifically to encourage participants to engage critically with their experience of networked learning and to invite reflective discussion on experiences and evaluation issues in small groups or in the larger course forum. For example, ‘closing rounds’ at the end of each learning unit were successful in terms of encouraging participant feedback and in stimulating research interaction. In this sense, there was a close connection between learning and research activities on the course. Interactions about participation were also instigated spontaneously, in the context of informal discussion. Through both observation and involvement in on-going interactions I was able to identify themes emerging from participants’ perspectives, and to begin exploring these collaboratively. As anticipated, however, not everyone on the course chose to contribute extensively (or in a few cases, at all) to these discussions – for reasons I would come to understand better as the research progressed. Whilst not the only factor, mixed experiences of commu-

nicating online in this environment were significant here. Most participants would subsequently identify contributing to CMC-based discussion as one of the most challenging aspects of being on the course, amounting, in one view, to '*learning a different form of communication*'. Looking back, some would judge later that they had experienced something close to 'real talk' online – talk which, as one participant said, could '*in some instances [be] more stimulating than some real life discussions I have been in*'. At the same time, others continued to feel that interacting via CMC was '*anything but a conversation*'. The research revealed a complex range of factors that in this context inhibited or constrained active participation in synchronous and asynchronous discussion; these included the impact of status differentials and gendered styles of online discourse, difficulties in self-presentation via text, and online group size. In that these factors impacted on relationships within the learning/research 'community', they can be identified as constraints on the constructivist commitment to inclusiveness and dialogical engagement in my project.

- *Reflective dialog with my critical friend, peer debriefing and personal journal.* In addition to focusing on observable processes and other participants' accounts of their experience and concerns, I aimed to reflect critically and systematically on the issues arising out of action from both my own and others' perspectives, and to document this reflection. Through both online and face-to-face dialog with my critical friend, and personal reflection, I explored issues and dilemmas that arose for me during the course as both practitioner and researcher. At times I was challenged to examine the relationship between my 'espoused theories' as a teacher and the nature and impact of my educational design and facilitation decisions. Regular review meetings with the course team offered opportunities to explore perspectives with other tutors and like other forms of 'reflection-on-action' (Schon, 1983) sometimes led to adjustments in the design of learning tasks and the way we approached the facilitation of learning activities.

### *Phase 3: (Re)Constructing, evaluating*

- *Closing online discussion and feedback questionnaire.* The close of the course was devoted to overall course evaluation and learning review activities, including a plenary discussion within the asynchronous conferencing environment and a detailed feedback questionnaire distributed in hard-copy by mail. Again, not everyone joined in the online discussion and so the questionnaire (completed in full by all participants) proved important from the point of view of triangulation and inclusive-

ness. Based on themes and concerns that had emerged as salient from my own and others' perspectives, it was designed mainly to gain more information about the logistics of participation, evaluative feedback on major elements of course design and facilitation, and perceived learning outcomes. Quantitative data were not collected with the purpose of generalizing findings to a wider population, but as a contribution to the detailed description of this setting and to the (re)construction of the action as a case. Questionnaire feedback was disseminated rapidly via NetLinkS project reporting.

- *Face-to-face research conversations.* I carried out face-to-face research conversations four months after the course with the large majority of participants. This timescale was convenient and was also intended to help counteract bias (the 'halo' effect) that sometimes occurs in evaluation that takes place immediately after the event; at the same time, participants could prepare for the discussion by revisiting the course Web environment – which contained a record of online discussions, learning activities and materials – and their learning journals. Using the term 'conversation' rather than 'interview' at this stage is intentional, since it draws attention to the dialogic and dialectical status of such interactions within the constructivist paradigm – as discussed by Fontana and Prey (1994), interpersonal processes associated more readily with 'real' conversational exchange than with classic research interviewing being fundamental here. My aim was to facilitate reflective dialog, as further support for (re)constructing the action and comparing different experiences and views within the stakeholder group; I was especially interested in exploring the extent to which consensus or divergence on specific issues might be identified. Beginning with an open question – "*what was being a networked learner on the course like from your point of view?*" – the conversations were designed both to identify new areas for exploration and to build on themes and perspectives that had emerged during earlier phases of the research. For example, a variety of indicators had already suggested that some participants had experienced barriers to participating in online discussions; I too had experienced dilemmas in aspects of online tutoring. I therefore wanted to pursue a line of discussion with all participants that would enable us to understand more about the factors affecting patterns of communication behavior on the course. On this topic as on others, participants knew something of others' experiences and views (including my own) already. In conversations, I drew further attention to similar or contrasting experiences and perspectives (without revealing individual identities), and to my own understandings, where I judged that this would assist in clarification of issues being dis-

cussed. I sometimes steered participants away from making assumptions about the extent to which views were shared within the whole participant group, or from jumping to conclusions about the experiences, motivations or attitudes of others – whilst noting when this occurred. I also explicitly raised issues to do with the research relationship between myself and other participants, albeit on the assumption that whilst it might be possible to move toward identifying ways in which power impacted on accounts produced within this context, it would not be possible to eliminate its presence or effects. Participants' feedback often suggested that the conversations were valuable in contributing to their own 'sense-making' in relation to their networked learning experience, as well as to my own.

- *Writing and member-checking.* Drawing on all forms of data collected during the project, including my research journal, transcripts of online discussion, questionnaire feedback and research conversations, and using qualitative data analysis software to assist in the analysis, I aim with the case study to present a 'thick description' of participation on the course. Since the purpose of case (re)construction is to provide a basis for evaluation and improvement of (my) educational understandings and practice, the narrative focuses on events, issues and perspectives that indicate strengths and weaknesses in the pedagogic model and its implementation. This entails adopting a 'warts and all' stance, highlighting participants' difficulties and frustrations as well as their satisfactions and successes, and drawing attention to points of tension or contrast as well as areas of common experience and viewpoint. I have aimed to offer readers of the case (both participants and others) a sense of the overall chronology of events, but have chosen to present the case primarily in thematic form, describing and interpreting key components in turn. Each thematic case description is followed by a reflective commentary, in which I draw on both my own and other participants' evaluative perspectives. Thus, whilst the case descriptions (re)construct key aspects of 'what happened', the case commentaries explore the question 'how should this be interpreted?' in relation to educational objectives, assumptions and strategies. I have not used vignettes or other fictionalizing techniques, but in using quotations to ensure that multiple voices are represented and highlighting certain events, I hope to bring shared experience to life. The balance between presenting my own experiences and perspectives as a participant, and those of others, is weighted in favor of the latter; however, ensuring the visibility of the researcher is clearly an essential component of action research reporting and I have included my own responses to key events alongside reflections on my role, and on

the issues I encountered in the course of the programme. In an effort to emphasize the roles of subjectivity and reflexivity in this work, the case study draws attention to my own part in framing the research focus as well as in contributing to the processes of action and sense-making.

#### *Phase 4: Theorizing, disseminating*

- *Developing 'living theory'.* As already indicated, there is a close relationship between evaluation and theory-building in the research approach adopted for this project. The evaluation research has illuminated a number of issues and processes that have implications for my educational understandings, and has enabled validation and further refinement of the pedagogic model tested on the course. The 'living theory' that has been developed through the research takes the form of a principled, conceptual framework for designing and facilitating professional development for networked learner support. The framework comprises two 'working models' – a curriculum model that addresses the question of learning objectives, and a pedagogic model that addresses educational design and facilitation issues. The curriculum model represents information specialists' learner support roles in terms of the interface between two principal areas of professional practice – information practice and educational practice – and identifies relevant learning themes within each of these areas. The pedagogic model identifies four key dimensions of educational design for networked learning – task design, socio-technical design, tutoring design and information design – and proposes an integrated approach to 'process support' for self-managed, collaborative networked learning within four broad developmental areas: orientation, socialization, communication and organization. Although designed to support practitioner learning in a specific context, the learning model has elements that may be applicable to other professional development areas within information science and beyond, and also constitutes a (researchable) action-plan for my continuing practice.

#### **Concluding remarks**

This paper has offered a rationale and a methodological framework for practice-based, participatory research in networked learning that brings together perspectives from constructivist evaluation and action research. In doing so, it touches on a number of issues that arise in this context, including some that relate to the use of CMC as a research medium. The focus has been on 'networked action research' as a methodology for evaluating, theorizing

and improving practice in networked learning, but there are also implications here for pedagogical design, most obviously in the context of networked professional development for educators and learner support staff.

## Acknowledgment

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## Note

1. Throughout this paper, I have followed Lincoln & Guba (1985) in their usage of the term 'constructivism', partly to acknowledge the influence of their methodological framework and partly to draw attention to connections between constructivism as a research perspective and as an educational theory. Lincoln and Guba's constructivist methodology engages with a number of strands in interpretivist, constructivist and social constructionist thinking, and recently their perspective has been described as 'social constructivism'.

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## Chapter 4

### Facilitating debate in networked learning: Reflecting on online synchronous discussion in higher education

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**Abstract.** Small-group collaborative learning in which students have opportunity for critical discussion is a key element of effective teaching and learning in Higher Education. Providing this sort of education through Networked Learning (NL) is challenging. Research in Computer Mediated Communication (CMC) is revealing that facilitating effective use of these tools depends on encouraging students to take many different dialog roles. Our hypothesis was that asking post-graduate students to reflect on the kinds of role they should take in synchronous online discussion would encourage adoption of such roles. A ‘role-play’ activity was introduced to post-graduate students who used a Virtual Learning Environment (VLE) as part of their course. Initial results showed that both distance and face-to-face students, native speakers (NS) and non-native speakers (NNS), working collaboratively on the same course through the VLE, had comparable outcomes on essay assignments and that NNS and distance learners slightly outperformed face-to-face students in their group work. Moreover, there was evidence that the facilitation technique of raising student awareness of roles was effective in helping (at least some) students manage synchronous online discussion more effectively, improving the overall coherence, focus and depth of discussion.

**Keywords:** chat, collaborative learning, computer mediated communication, networked learning, online communities, synchronous discussion, virtual learning environment

### Introduction

Small-group collaborative learning in which students have opportunity for critical discussion with the tutor and other students is a key element of effective teaching and learning in Higher Education. Such teaching methods are said to help develop students’ ability to reason in a specialist subject area. Providing such opportunities can pose a challenge for networked learning programmes. Computer Mediated Communication (CMC) is increasingly being used as a vehicle for providing student support on courses that, like the course to be discussed here, mix students from around the world in a virtual learning environment (VLE). Some are native speakers (NS) of the target language whilst others are not. Some are based locally and may have some face-to-face contact with other students and the tutor; others do not. All must interact effectively if the objectives of the course are to be met. In face-to-face classrooms non-native speakers (NNS) often struggle to keep up with

the flow of discussion or have difficulty in expressing ideas in writing. Are NNS students in the computer-assisted classroom at a similar disadvantage? Can those who never meet the tutor or fellow students face-to-face use the VLE effectively to meet their learning objectives?

There are many advocates for providing interaction with, through or around computers as a means of developing conceptual understanding or intellectual skills (Crook, 1994). Advantages of using CMC can include greater inclusion and participation by students. CMC allows students more opportunities to speak than occur in traditional classrooms where the tutor tends to take up to 80% of the dialog (Sullivan & Pratt, 1996). Increased participation in discussion may be of particular benefit to non-native speakers (NNS) of the target language.

McCrosky, Fayer and Richmond (1985) point out that there may be significant apprehension amongst NNS in speaking the target language and this may inhibit classroom discussion. Many authors have suggested that CMC provides a less threatening medium for expression, can be highly motivating for NNS, and can also be more inclusive for shy, disadvantaged students (Chun, 1994; Pennington, 1996; Warschauer, 1996; Beauvois, 1998).

Sullivan and Pratt (1996) report that the quality and quantity of writing for second language students improves in the computer-assisted classroom employing electronic discussion. However, others have noted that whilst fluency in exchanging ideas and grammatical complexity may increase, there may be a trade-off in loss of accuracy (Li, 2000; Lee, 2002). Students risk more in CMC with beneficial effects on fluency, but if written grammatical accuracy is also important, e.g. in essay assignments, performance may not be as great.

Whilst the research reported here cannot answer these questions through controlled comparison of distance, face-to-face, NS and NNS groups, comparisons of individual students' performance in synchronous online discussion, on group-work and on essay assignments can be made. In addition, a central aim was to examine techniques for facilitating CMC that might help students make the most of the opportunities for interaction it affords.

### **Facilitating CMC discussion – constructive participation**

Research in Computer Mediated Communication (CMC) is revealing that facilitating discussion using CMC tools within VLEs depends even more critically on encouraging students to take many different dialog roles for themselves. This is because it is more difficult for the tutor to actively steer synchronous online debate than synchronous debate in the face-to-face classroom.

The main reason for this is that online participants are not able to 'see' or 'hear' other participants in the process of 'speaking' and so it is very likely that a person may interrupt someone else's reply, creating inter-leaved multiple parallel threads of conversation (Herring, 1999). As a result, users may find it difficult to focus the dialog.

Thus, the advantages of CMC tools have a flip side. On the one hand, students take a greater proportion of the conversation in CMC than in face-to-face classroom discussion because turn-taking is less restricted, with the possibility of several participants composing responses in parallel. On the other hand, participants need to develop new skills to manage multiple parallel threads of discourse in ways that enable coherence and focus to be maintained (Herring, 1999). This in turn creates an additional load for the tutor in steering discussion effectively (Pilkington, Bennett & Vaughan, 2000; Kuminek & Pilkington, 2001).

For this reason it may be particularly important for the tutor to encourage students to take more responsibility for managing the focus of the discussion. This may include encouraging them to take *management roles* they normally consider to be the tutor's. These roles are aimed at negotiating the task and the use of group resources (including time-management) to meet the discussion objectives (Johnson & Johnson, 1994; Robertson, Good & Pain, 1998; Kuminek & Pilkington, 2001). Such roles are particularly important in collaborative learning where students are expected to produce a jointly negotiated product at the end of the discussion. Although judgments about what is relevant play a part in informing the management of focus role, such role-taking need not be very subject-knowledge rich. Rather these roles involve dividing the available time or participants between sub-tasks and reminding the group of the question at hand when the group drifts off-task. Whilst these roles might traditionally be viewed as the facilitator's, it is difficult for the tutor to manage these roles without help from students in CMC (Kuminek & Pilkington, 2001).

Regular users of CMC appear to invent mechanisms to negotiate turn-taking and identify multiple parallel threads. For example, in synchronous CMC the prefacing of a turn with the name of the participant to whom the comment is addressed can help to disentangle interleaved threads (Werry, 1996). Such adaptations may be acquired through practice, and the impact of encouraging students to adopt such strategies merits further investigation.

Another important class of roles students need to take is *community-building roles*. These employ sending, receiving, and acknowledging skills and strategies for applying 'ground-rules' that develop trust. Such ground rules include giving everyone an equal chance to speak, and listening and responding to the contributions of others (Johnson & Johnson, 1994; Robertson,

Good & Pain, 1998; Wegerif & Mercer, 1996). Before a community can become a knowledge-building community it is first necessary to establish a 'safe space' in which the sharing of knowledge is encouraged and validated (Pilkington & Walker, in press). Berzsenyi (1999) argues the need for actively discouraging disruptive off-task talk whilst encouraging positive feedback or 'validation' of useful contributions.

A final class of roles students need to adopt are the *argumentation roles*. In creating a community with the aim of developing a critical understanding of a subject it is important to encourage learners to explain and justify their reasoning. However, such discussion roles have to be learned through exposure to appropriate role models (Crook, 1994; Harwood, 1995; Robertson, Good & Pain, 1998; Wegerif & Mercer, 1996; Kuhn, 1991).

Argumentation roles involve using a range of dialog moves to engage in creative conflict (Burnett, 1993; Wegerif & Mercer, 1996; Veerman, Andriessen & Kanselaar, 2000; Kneser, Pilkington & Treasure-Jones, 2001). Mercer, Wegerif and Dawes (1999) taught primary school children *not* to simply agree with or accept each other's suggestions nor to simply dismiss them but rather to engage critically with them. Statements could be challenged and counter-challenged, but challenges had to be justified, assertions supported or alternative hypotheses offered (Wegerif & Mercer, 1996, p. 5). Children taught to engage in such 'exploratory talk' improved their reasoning and transferred the use of exploratory talk to other learning contexts.

Part of the motivation behind the research reported here is to examine whether adult learners, encouraged to adopt these three different classes of roles, might also improve the coherence, focus and depth of their discussion (Kuminek & Pilkington, 2001; Pilkington & Kuminek, 2002). The hypothesis was that making students aware of the need for *community building roles*, *management roles* and *argumentation roles* would, over time, increase the adoption of these roles – in turn improving the coherence, focus and depth of discussion.

### **The role-taking exercise**

A 'role play' activity was designed and used with a class of postgraduate students. Sixteen students completed the course and attended chat tutorials on a Master of Education module called "Learning and the New Technologies". The role-play exercise was piloted with undergraduate students (Pilkington & Kuminek, in press) based on techniques used with younger children (Pilkington & Walker, 2003). The application in the postgraduate student context differs slightly due to the mixed modes of study of the stu-

dents and the level of the course (see also Pilkington, 2001; Pilkington, 2003).

The course caters for both face-to-face and distance learners and is supported by a WebCT<sup>1</sup> Virtual Learning Environment (VLE). Distance students are part-time students who have no face-to-face classes and are reliant on the VLE for all contact with the tutor and fellow students. As part of the course all students took part in a weekly synchronous CMC chat debate, facilitated by the tutor and based on set reading (weekly online course-notes plus two set research papers on the topic for that week). This debate took place at two different times each week to enable as many students as possible to attend. There were therefore two groups, the Monday group and the Tuesday group. At the start of the course students chose which of the two groups they wished to attend, choosing the time that was most convenient to them. The Monday group regulars tended to be mainly NS whilst the Tuesday group regulars tended to be NNS. There was some movement between groups with Monday group regulars occasionally attending on Tuesday and vice versa and students did not all attend all sessions. The average overall attendance was 9 out of 11 sessions. Both groups attracted face-to-face and distance learners.

In addition to online debates the tutor set exercises, the instructions for which were also online, to accompany each weekly topic. Face-to-face students (either full-time or part-time) take a two-hour class with the tutor each week within which the exercise is incorporated. Distance learners completed the exercises in their own time with a distant partner. Both types of learner posted their collaborative answers to the online asynchronous discussion board.

The role-taking exercise took place in week 7 of the course, after the students had become familiar with synchronous online chat debates. Students completed the reading for the regular debate in the normal way. Students read the course notes for the topic that week (week 7), which was on the nature of CMC communication, and also read the two research papers for the online debate (Robertson, Good & Pain 1998; Wegerif and Mercer 1996). Before taking part in the chat, as part of the exercise students debated (with their partner or small group) the discussion skills required for collaborative learning. Having done this, students fed their joint answers back to the class as a list of the roles they thought they should take in debate and grouped these according to whether they were community building, management or argumentation roles. The list of roles the students suggested were:

1. WebCT: for more information see URL: <http://www.webct.com/> retrieved on 15/01/02.
2. Exploratory inquiry – asking others to elaborate, explain or clarify anything that is unclear or not explained in enough depth or asking for other examples.

3. Task management/focus – keeping people focused on the issues to be discussed, encouraging them to move on when necessary and to discuss as many of the issues as possible in the time available.
4. Encouraging participation – encouraging those who are not participating to join in whilst encouraging others to make space for them.
5. Positive feedback – encouraging contributions by giving positive feedback when someone contributes well.
6. Negative feedback – discouraging disruptive off-task behavior, in appropriate social behavior, SHOUTING or non-constructive criticism.
7. Content building – answering others' requests for suggestions, points of view, examples, evidence or explanations.

During the regular synchronous chat debate, students were asked to try to play all 7 roles they had suggested and, in addition, were each randomly assigned one of the roles (not including role 7) as a special responsibility. Role 7 was not given as a special responsibility to any one person as it was felt that the other roles could all be carried out with a degree of independence from subject-knowledge whereas role 7 demands adding subject-content statements to the debate. After the debate, working collaboratively, students composed joint reflections on the chat and posted these to the asynchronous discussion board.

In synchronous debates following the role-playing exercise (weeks 8–11) students were not asked to adopt roles in the discussion – as had been the case before the role-taking exercise. Table 1 shows the members of each group, whether NS or NNS, part-time, full-time students (attending face-to-face classes) or distance students (reliant on WebCT for all contact with tutor and students). The table also shows whether students attended the chat in the reported weeks (week 4 before the introduction of roles, week 7 in which they played roles and week 10 without further instruction to play roles).

### **Use of the WebCT virtual learning environment and learning outcomes**

Students showed a different pattern of working with the VLE and different learning outcomes according to whether they were distance learners (not attending face-to-face sessions), full-time or part-time face-to-face students and whether they were native or non-native speakers.

Communication tools pages form the WebCT gateway to e-mail, asynchronous and synchronous discussions, giving an indication of total student use of the CMC tools for study or social contact using the VLE. Content pages are the WebCT gateway to course notes and give an indication of the total number of times students accessed these notes.

*Table 1. Students taking part in the chats, their groups and their additional role in week 7*

Student pseudonym	Mode of study: part-time (PT), full-time (FT), distance (D)	Native (NS) or non-native speaker (NNS)	Chatt attendance Monday (Mo) or Tuesday (Tu) in weeks 4, 7 and 10, total (T) chats attended		Additional special role in week 7
Jake	D	NS	Mo 4, 7, 10	T = 11	1: challenge
Laruen	D	NNS	Tu 4, 7	T = 09	2: explore inquire
Ruth	D	NNS	Tu 4, 7, 10	T = 11	4: encourage in
Olive	D	NS	Mo 4, 7, 10	T = 11	3: manage focus
Lawrence	D	NS	Tu 4, Mo 10	T = 10	–
Doris	D	NNS	Tu 4, 7, 10	T = 11	1: challenge
Beth	FT	NS	Tu 4, 7	T = 07	3: manage focus
Ian	FT	NNS	Tu 7, 10	T = 03	5: +ve feedback
Gerry	FT	NS	Mo 4, 7, 10	T = 10	5: +ve feedback
Helen	FT	NNS	Tu 4, 7	T = 08	2: explore inquire
Shirley	FT	NNS	Mo 4, Tu 7, 10	T = 08	5: +ve feedback
Mae	FT	NNS	Tu 4, 7	T = 10	2: explore inquire
Dean	PT	NS	Tu 4	T = 05	–
Clark	PT	NS	Mo 4, 7	T = 07	6: discourage off-task
Vince	PT	NS	Mo 4, 7, 10	T = 11	3: manage focus
Fiath	PT	NS	Tu 4, 7, Mo 10	T = 10	4: encourage in

Group work scores were allocated to projects so that each individual in the group received the same mark based on the evaluation of their project. Group work projects involved the creation of a web resource over a period of five weeks through collaborative learning. A component of the group work score was allocated for collaboration and balanced contribution by group members in producing the final resource. The project assessment (including its component for effective collaboration) was formative and did not count toward the students' final degree classification, whilst the essay assignment score did.

From Tables 1 and 2, distance learners with no face-to-face attendance showed slightly greater average attendance of online chat discussions and also showed a greater number of hits on communication tools pages. The pattern for group-work scores and hits on communication tools pages was similar with, on average, distance students scoring most highly and face-to-face part-time students least highly for both hits on communication pages and group-work scores. Part-time face-to-face students and distance learners would be expected to find it more difficult to find common times and places to collaborate on group-work. Moreover, given that group-work assignments did not count directly toward degree classification, these groups might be expected



*Table 2.* Mode of study (part-time, full-time or distance), performance on essay and group-work assignments and number of times accessing pages in the VLE

Mode of study	Essay score	Group-work score	Hits on content pages	Hits on communication tools pages
Distance				
Mean	61.40	15.33	39.83	184.50
<i>N</i>	5	6	6	6
Standard deviation	5.41	1.81	14.34	42.32
Full-time				
Mean	64.50	12.75	57.83	155.17
<i>N</i>	6	6	6	6
Standard deviation	4.76	0.69	9.15	62.04
Part-time				
Mean	68.67	12.00	28.25	98.00
<i>N</i>	3	4	4	4
Standard deviation	3.06	0.00	13.15	24.81
Total				
Mean	64.29	13.53	43.69	151.88
<i>N</i>	14	16	16	16
Standard deviation	5.18	1.84	16.75	56.63

to have applied more of their limited time to essay assignments. However, in contrast to face-to-face part-time students and despite their greater difficulty in meeting face to face, distance students used the WebCT communication tools to out-perform even full-time face-to-face students in the production of a coherent group Web-site: an indication that networked learning was effective in supporting collaborative learning.

Distance learners did not access online course notes as much as full-time face-to-face students who made most use of the VLE for this purpose. Part-time face-to-face students made least apparent use of course content online. This difference between groups appears interesting. However, it is likely that on this course, these differences are due to face-to-face part-time students and distance learners adopting strategic printing of course notes to avoid phone charges incurred by reading course notes online at home.

On the essay scores, overall, face-to-face students (part-time and full-time) very slightly outperformed distance students (who were also more likely to be NNS) but due to the small numbers of students involved this result could have occurred by chance and must be treated cautiously.

*Table 3.* Native and non-native speakers of English, performance on essay and group-work assignments and number of times accessing pages in the VLE

English speakers	Essay score	Group-work score	Hits on content pages	Hits on communication tools pages
Native				
Mean	64.88	13.16	36.89	127.11
<i>N</i>	8	9	9	9
Standard deviation	5.41	1.92	16.34	42.42
Non-native				
Mean	63.50	14.00	52.43	183.71
<i>N</i>	6	7	7	7
Standard deviation	4.76	0.78	13.69	59.30
Total				
Mean	64.29	13.53	43.69	151.88
<i>N</i>	14	16	16	16
Standard deviation	5.18	1.84	16.75	56.63

Overall, NNS achieved very comparable outcomes with NS on essay assignments. Moreover, NNS did better on group-work possibly through increased use of communication tools to collaborate (although the direction of any cause and effect cannot be certain here and caution is advised given the small number of students involved). These results are interesting though, because NNS expressed anxiety concerning the quality of their English and how it might affect both the quality of their written work and their ability to communicate effectively in discussion. It has to be borne in mind that these students are pre-selected for the course on the basis of a teaching of English as a foreign language test score (TOEFL) of 4 or above for written English (a course entry requirement). Students less proficient in English might have struggled more. Nevertheless the result indicates that distance students and NNS were able to make effective use of the VLE.

### **Impact of the role-play exercise**

The impact of the role-taking exercise on the quality of synchronous discussion in both the Monday group (mainly NS) and the Tuesday group (mainly NNS) discussions in weeks 4, 7 and 10 (before, during and after the role-play exercise) are now compared. For this analysis the number of instances

of taking particular roles was totaled for each student in each dialog. In addition, unedited extracts from the dialogs are used to illustrate the impact on coherence, focus and depth of discussion. Both groups have regular members who are full-time, part-time or distance learners (who do not take face-to-face classes). Table 1 lists students, their mode of study and group. In the results tables that follow, NA indicates a non-attending student whilst Mon (Monday) or Tues (Tuesday) indicates the student attended the alternative group session that week.

### **Balance of participation – inclusion in the chat**

The balance of participation is represented by the percentage of the total number of words produced by each participant in Table 4. A comparison of the proportion of words produced by each member of the group in week 4 before the role-taking exercise shows that in both debates in week 4 the tutor, Lana tends to dominate. Lana is the active tutor whose role it is to facilitate the debate.

Before the introduction of roles (week 4), in the Monday group (mainly NS), Vince and Olive between them produce a third of the words and remaining group members participated little. In the Tuesday group (mainly NNS), Rudolph, Dean and Fred shared a third of the dialog with the remaining students participating little. During the role-taking exercise (week 7), participation was more inclusive and the tutor (Lana) dominated less. The tutor's contributions in week 7 were down approximately 15%. By week 10 (with no further instruction to play roles), this had crept back up to 33% in the Monday group (mainly NS) and 41% in Tuesday group (mainly NNS) but was still less than previously.

The space left by the tutor in week 7 was filled by other students: Ruth, Doris and Shirley, in particular, took more active roles in the Tuesday group (NNS) whilst Vince and Olive dominated less and shared more with Clark and Gerry in the Monday group (NS). However, when recording their impressions of the discussion, Vince still felt that he and Olive dominated the discussion whilst in the Tuesday group, Beth (NS) and Helen (NNS) felt strongly that others ought to wait until everyone's point had been addressed and not move on too quickly. Beth also thought that Lana (the tutor) had still dominated the discussion.

In week 10 although several students were absent, overall the improved balance of participation seemed to be at least partially sustained (despite no further instruction to apply roles).

*Table 4.* Balance of participation in chat discussion (number of words typed in the dialog)

Total words typed in chat	Words week 4	%	Words week 7	%	Words week 10	%
<b>Monday</b>						
Lana (tutor)	1091	45.4	942	31.1	884	32.9
Cherry (assistant)	14	0.6	55	1.8	256	9.5
Olive	391	16.3	726	24.0	350	13.0
Gerry	114	4.7	343	11.3	297	11.0
Clark	172	7.2	298	9.8	NA	
Jake	109	4.5	101	3.3	84	3.1
Vince	358	14.9	567	18.7	247	9.2
Shirley	153	6.4	Tues		Tues	
Faith	Tues		Tues		375	13.9
Lawrence	Tues		NA		198	7.4
Sum	2402		3032		2691	
Mean	300.3		433.1		336.4	
Std. dev.	344.0		327.2		239.2	
<b>Tuesday</b>						
Lana (tutor)	1178	42.2	972	27.2	936	41.4
Cherry (assistant)	27	1.0	5	0.1	12	0.5
Lauren	72	2.6	242	6.8	NA	
Mae	27	1.0	18	0.5	NA	
Helen	80	2.9	159	4.4	NA	
Beth	176	6.3	535	15.0	NA	
Doris	71	2.5	384	10.8	438	19.4
Dean	334	12.0	NA		NA	
Ruth	290	10.4	461	12.9	285	12.6
Faith	349	12.5	392	11.0	Mon	
Lawrence	188	6.7	NA		Mon	
Shirley	Mon		303	8.5	584	25.8
Ian	NA		99	2.8	6	0.3
Sum	2792		3570		2261	
Mean	253.8		324.5	376.8		
Std. dev.	328.8		277.8		357.3	

## Community building roles

Community building roles apply the ground rules of encouraging others into the discussion (role 4), giving positive feedback (role 5) and discouraging off-task talk (role 6). From Table 5 it can be seen that overall the role-taking exercise brought about an increase in the number of students taking community building roles. In week 4 (before roles were introduced) Shirley (NNS) showed below average or average role-taking across all categories of role. During the role-taking exercise she improved her level of participation, increasing her number of turns to above average and also increasing her role-taking in general. Although she did not explicitly increase the number of positive feedback utterances (as would be expected from her additional role assignment), she did increase the number of simple 'yes' agreements without further comment and these may have been an attempt to play this role. Others also increased the number of simple agreements. An example can be seen in the extract from the chat dialog in Table 7 (Doris). In the same extract Ruth can also be seen encouraging others into the conversation by asking them what they think (role 4).

Gerry (NS), with special responsibility for giving positive feedback (role 5) increased these compared with week 4 to above average for the group during the role-play in week 7 but slipped back somewhat in week 10. Vince (NS) showed a strong increase in encouraging others into the conversation (role 4) and giving positive feedback (role 5) during the role-play exercise even though this was not his additional special responsibility.

He also continued this new level of community building role-taking in week 10. Olive (NS) appeared to be a natural encourager, performing above average in all community building roles in week 4 (before roles) as well as week 7 (with roles) and maintaining this level in week 10 (after roles).

## Managing the dialog and responsibility for focus

The task management and focus (role 3) involved keeping people focused on the issues to be discussed and moving on when necessary. Focus role-taking is illustrated in Table 6. The role-taking exercise had a marked effect on students' adoption of the focusing role. In week 4 the tutor produced 65% of the focus role-taking in the Monday group (mainly NS) and 100% of the focus role-taking in the Tuesday group (mainly NNS).

During the role-play in week 7 the tutor shared responsibility for this role with both Olive and Vince in the NS group. Olive produced 40% of such roles, Lana the tutor 31% and Vince 20%. Both Olive and Vince had been given the management of focus role as their additional responsibility. In the

*Table 5. Community building roles: number of instances of encouraging participation (role 4), giving positive feedback (role 5) and discouraging disruptive behavior (role 6)*

Community roles	Week 4			Week 7			Week 10		
	Role 4	Role 5	Role 6	Role 4	Role 5	Role 6	Role 4	Role 5	Role 6
<b>Monday</b>									
Lana (tutor)	1	9	1	0	4	0	2	3	0
Cherry (assistant)	0	0	0	0	0	2	1	0	0
Olive	0	3	3	4	12	2	7	1	2
Clark	0	1	0	0	3	0	NA	NA	NA
Jake	0	0	0	1	3	0	1	0	0
Vince	1	0	0	5	5	1	6	1	0
Shirley	0	2	0	Tues	Tues	Tues	Tues	Tues	Tues
Faith	Tues	Tues	Tues	Tues	Tues	Tues	3	1	0
Lawrence	Tues	Tues	Tues	NA	NA	NA	0	1	0
Sum	2	16	4	11	32	5	24	9	2
Mean	0.3	2	0.5	1.6	4.6	0.7	3	1.1	0.3
Std. dev.	0.5	3.0	1.1	2.1	3.7	1.0	2.5	1.0	0.7
<b>Tuesday</b>									
Lana (tutor)	0	10	0	6	6	0	4	3	0
Cherry (assistant)	0	0	0	0	0	0	0	0	0
Laruen	1	1	0	0	2	0	NA	NA	NA
Mae	0	0	0	0	0	0	NA	NA	NA
Helen	0	0	0	1	2	0	NA	NA	NA
Beth	0	0	0	0	0	0	NA	NA	NA
Doris	0	1	0	3	3	1	0	5	0
Dean	0	0	0	NA	NA	NA	NA	NA	NA
Ruth	0	1	0	3	0	0	0	2	0
Faith	0	1	0	6	5	0	Mon	Mon	Mon
Lawrence	0	1	0	NA	NA	NA	Mon	Mon	Mon
Shirley	Mon	Mon	Mon	3	2	0	1	8	0
Ian	NA	NA	NA	1	2	1	0	0	0
Sum	1	15	0	23	22	2	5	18	0
Mean	0.1	1.4	0	2.1	2	0.2	0.8	3	0
Std. dev.	0.3	2.9	0	2.3	2.0	0.4	1.6	3.1	0

Tuesday group (mainly NNS), Beth (NS) was given this role as an additional special responsibility and produced 26% of focus role-taking whilst the tutor produced 36% and Doris (NNS) who was given the additional special responsibility of exploratory inquiry (role 2), produced around 17%.

However, from the discussion in both the NS and mainly NNS groups it was clear that students believed the management of focus was the responsibility of the tutor.

*Table 6.* Focus management roles: number of instances of taking task management roles (role 3)

Focus role	Monday			Focus role	Tuesday		
	Week 4	Week 7	Week 10		Week 4	Week 7	Week 10
Lana (tutor)	13	14	6	Lana (tutor)	7	15	8
Cherry (assistant)	0	2	0	Cherry (assistant)	0	0	0
Olive	2	18	0	Lauren	0	1	NA
Gerry	1	0	0	Mae	0	0	NA
Clark	1	1	NA	Helen	0	0	NA
Jake	0	0	0	Beth	0	11	NA
Vince	0	9	1	Doris	0	7	3
Shirley	3	Tues	Tues	Dean	0	NA	NA
Faith	Tues	Tues	1	Ruth	0	1	2
Lawrence	Tues	NA	0	Faith	0	3	Mon
				Lawrence	0	NA	Mon
				Shirley	Mon	1	5
				Ian	NA	2	0
Total	20	44	8		7	41	18
Mean	2.5	6.3	1		0.6	3.7	3
Std. dev.	4.45	7.4	2.1		2.1	5.1	3.1

Olive (NS) in the Monday group commented that the tutor needed to ‘lead without seeming to lead’ and Vince (NS) felt that the role of the tutor often included time-keeping as well as facilitating. In the extract in Table 7 from the Tuesday (mainly NNS) group (week 7), it would appear that opinions vary as to how strong a lead the tutor should take – suggestions ranged from facilitator to leader.

However, notice that at this stage in the dialog they have adopted the strategy of naming the individuals they are addressing, both to encourage them into the dialog and to address responses to earlier points. Shirley’s opinion is invited twice by name (encourage role 4) and in addition Shirley is responding more frequently, more confidently and more relevantly than in week 4 (before roles). The general effect of addressing turns to named individuals is to markedly improve the coherence of the dialog for everyone. Beth (NS) keeps the group on track (role 3) and draws them to a conclusion, provided by Ruth’s (NNS) summary. There is a general sense of the group attempting to put into practice the ground rules they have been discussing.

*Table 7. Tuesday group (mainly NNS) discussing the role of the tutor in week 7 (with roles)*


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Beth	I think that the tutor should model the roles on the ground rules, coach the students in exploratory talk.
Ruth	What do you think about this?
Helen	I think that when the teacher participate in the discussion the students elaborate more and comment on their opinions.
Faith	Shirley – what is your experience in the primary role of the teacher in group debate?
Doris	A facilitator of what exactly, Lauren? Could you give a short example?
Ruth	He also has to encourage participation to the three ways of talking elaborated by Mercer i.e. disputational talk, communicative talk as well as exploratory talk. Do you agree on that?
Shirley	Faith, I think they cannot play a hierarchical and agonistic role, but be empathic and dialectical.
Doris	Yes I agree. But what would happen if the tutor lost the control concerning the disputational talk?
Helen	What do you mean empathical, Shirley?
Faith	I see thank you Shirley. Do you think that they must control the debate – or is the control with the students?
Lauren	He helps overcoming difficulties and finding strategies to convey knowledge.
Beth	The teacher should limit control over the discussion, it should be gradually phased out if students are to benefit from the exercise.
Helen	Sometimes teacher may give the initial stimulus for the discussion.
Beth	It is important the teacher allow the students to develop the skills.
Shirley	Mean sth like a rapport talk, Helen. Being friendly.
Doris	Concerning the leadership skills, how could the teacher help with this?
Beth	Time is moving swiftly, are there any other roles of the teacher?
Ruth	To summarize the role of the teacher in a dialog can take various forms for example as helper, interpreter, guide, a model of profession, an expert etc. What do you think?

---

Beth (NS) felt that adopting the roles helped the dialog to stay focused. In contrast, Faith (NS) thought that adopting the roles made it more difficult to have a meaningful discussion. As illustrated in Tables 7 and 8 there was a degree of frustration caused by the tension between focusing on the task issues and addressing issues that came up. Beth thought that there was a tendency to move on before addressing others' points. Later she commented that if everyone's ideas were to be considered then they couldn't discuss so many issues in the time allotted. This in part would seem to reflect both Beth (as the



*Table 8.* Early problems in focusing the debate Tuesday group (mainly NNS) week 7 (with roles)

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Lana	So people lets get focused – the first discussion point is – what ‘ground rules’ need to be adopted if collaborative dialog is to be constructive for learning and problem solving? Can we have a go at this question first?
Faith	Should we start with the ground rules? Perhaps some of our overseas students would like to give us some of their ideas?
Lana	Snap!
Beth	What about my question?
Lana	Can we come back to it when we discuss the role of the computer Beth – that is discussion point 4 or something?
Faith	Beth – I guess we can come to your question in a short while. Doris – did you spot any ground rules?
Doris	About the ground rules: these could be divided into objective one and subjective ones?
Beth	Ok, the ground rules include us listening to each other, coming to an agreement.
Faith	Please go on.
Faith	Please go on.
Lana	Both of you!
Ruth	First: Each member of the group should be asked in relation the subject on discussion (What do you think, Why do you think that). Second: After the discussion the group should agree on a group idea.
Beth	We should all seek to clarify our ideas, ensuring that everyone understands.
Lauren	How can you measure that?
Beth	That what?
Doris	Please, could we stay on task?

---

one given the additional special responsibility for focus) and the group as a whole learning to manage the complexity of multiple parallel threads in CMC when learning to work collaboratively in networked learning environments.

At times during the role exercise Lana (tutor) appeared to compete with students also given the focus management role, as the extract in Table 9 (mainly NNS) illustrates. There are certainly early difficulties in focusing the debate in week 7 which improve toward the end of week 7 and in subsequent sessions.

This improved sharing of responsibility for the focus of the discussion was sustained in the week 10 NNS group where once again the tutor produced

*Table 9.* Argument roles: number of challenges (role 1), inquires (role 2) and content building (role 7)

Argument roles	Week 4			Week 7			Week 10		
	Role 1	Role 2	Role 7	Role 1	Role 2	Role7	Role 1	Role 2	Role 7
<b>Monday</b>									
Lana (tutor)	9	14	21	11	14	19	9	7	26
Cherry (assistant)	0	0	0	0	0	0	8	1	9
Olive	3	3	19	8	8	32	4	10	12
Gerry	1	0	9	8	1	13	7	5	8
Clark	2	0	12	10	3	5	NA	NA	NA
Jake	0	3	7	5	1	2	1	3	3
Vince	3	2	28	9	11	20	4	4	11
Shirley	3	2	8	Tues	Tues	Tues	Tues	Tues	Tues
Faith	Tues	Tues	Tues	Tues	Tues	Tues	4	8	13
Lawrence	Tues	Tues	Tues	NA	NA	NA	5	2	6
Sum	21	24	104	51	38	91	42	40	88
Mean	2.6	3	13	7.3	5.4	13	5.3	5	11
Std. dev.	2.9	4.6	9.0	3.7	5.6	11.5	2.6	3.1	6.9
<b>Tuesday</b>									
Lana (tutor)	8	12	21	9	9	19	9	12	16
Cherry (assistant)	1	0	1	0	0	0	0	0	0
Laruen	0	0	6	3	2	14	NA	NA	NA
Mae	0	0	2	0	1	0	NA	NA	NA
Helen	3	0	7	2	4	9	NA	NA	NA
Beth	4	0	8	13	13	15	NA	NA	NA
Doris	0	1	5	6	16	9	7	2	17
Dean	6	4	24	NA	NA	NA	NA	NA	NA
Ruth	4	1	17	2	6	15	6	3	14
Faith	2	3	18	5	7	10	Mon	Mon	Mon
Lawrence	1	0	7	NA	NA	NA	Mon	Mon	Mon
Shirley	Mon	Mon	Mon	7	9	11	13	3	30
Ian	NA	NA	NA	3	1	3	0	0	0
Sum	29	21	116	50	68	105	35	20	76
Mean	2.6	1.9	10.5	4.5	6.1	9.5	5.8	3.3	12.7
Std. dev.	2.7	3.6	8.0	4.0	5.2	6.3	5.1	4.5	11.4

44% of this role, but the tutor returned to producing 75% of the instances of focus role-taking in the NS group in week 10. This may indicate the need for further scaffolding of this role in which the tutor gradually lets go of the role in favor of students managing the discussion for themselves.

### **Developing critical discussion – exploratory dialog**

The key argumentation skills are those involving taking roles 1, 2 and 7. Role 1 is that of challenging others to provide evidence and pointing out alternatives or contraindications. Role 2 is an inquiry role which asks for explanations and clarifications. Role 7, building content, is the offering of content information spontaneously or to answer an inquiry.

From Table 9 it can be seen that in week 4 (before roles) the tutor provides between 27% and 42% of challenges. This reduces to between 18% and 21% in week 7 and between 21% and 25% in week 10. Accompanying this change there is a shift toward students becoming more critical in debate. In the mainly NS group, Olive, Gerry, Clark, Vince and Jake all show higher levels of challenging in week 7 and continue to show higher overall levels in week 10 (except for Clark who was absent). In the mainly NNS group there is a similar story with a generally higher level of exploratory talk in week 7. In particular, Shirley (NNS) improves markedly in challenging, inquiring and building content in week 7 and this is further improved upon in week 10.

From Table 9 it can be seen that Doris (NNS) who was given role one (challenge) increases her challenging from 0 to 12% in week 7 and to 20% in week 10. Lauren (NNS) and Helen (NNS), both given role 2 (exploratory inquiry) in week 7 raised their inquiries from 0 in week 4 to 3% and 6% respectively in week 7 but were both absent in week 10. Beth (NS), Faith (NS), Doris (NNS) and Shirley (NNS) raised their number of inquiries even more, despite this not being their additional special role. Doris raised her level of exploratory questions from 4% to 23% (from 1 to 16 questions) but dropped back to 10% in week 10, whilst Beth raised her level of exploratory question asking from 0 to 19% but was absent in week 10.

In the extract in Table 10 Lana (tutor), Lauren, Doris and Helen infer the difference between a follow-up and a feedback turn in one parallel thread, whilst Ruth and Shirley pursue a thread discussing the tutor's role in scaffolding discussion skills. Lana uses a contrasting example to help prompt Lauren to suggest a defining distinction between follow-up and feedback. This example illustrates a degree of mastery in focusing the chat since both threads remain coherent and greater depth in argument is achieved. This would not be possible without the strategic use of names within the text to signal which points are being addressed. For example, Lana should have included the name Lauren in the second of her two turns, one immediately after the other at the beginning of this extract. If she had not added Ruth to the first turn, it would be very difficult to disentangle the two different parallel threads to which Lana's turns respond.

No one individual was given the role of content building as their additional special responsibility. However, the general level of content building fell as

*Table 10.* Illustrating focused, coherent exploratory dialog with multiple parallel threads Tuesday group (mainly NNS) in week 7 (with roles)

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Ruth	I understand that in the first stages of the tutor is supportive, in more advance stages groups of pupils work independently of the teacher. So the teacher's role moves progressively from one of group leader, to the one of facilitator and finally to the one of observer.
Lauren	Follow up may contain either positive or negative re-iteration of the learning point.
Lana	Yes Ruth I agree!
Lana	That's a feedback type turn.
Doris	So, could we say that follow-up and feedback is the same thing?
Lana	It often is in a learning situation.
Shirley	Do you mean that computer can help the student in their independ learning, Ruth?
Helen	Yes Doris, I think they are the same thing.
Lauren	As I see it Follow up is a wider concept which can be applied to conversation outside the classroom context.
Lana	That's true Lauren!
Ruth	Computer is a mediating learning tool but it needs the presence of the tutor, Shirley.
Shirley	Alway, Ruth?
Doris	Yes, so concerning dialog process based on comp. we have follow-up or feedback?
Shirley	Always = alway.
Ruth	Not always but the role of tutor is crucial in many times.
Lauren	The concept of feedback has been abandoned by Sinclair and Coulthard, I think.
Shirley	I agree.
Beth	What is its function in the actual dialog?
Lana	IRF not abandoned but modified because it is more complex than just this: Hi Dave how are you? (I) Not bad thanks (R) Glad to hear it! (F) or What's the capital of France (I) Paris (R) Correct! (F).
Lauren	Feedback could be defined as evaluative whereas follow up can just be acknowledging a response.
Faith	I agree Lauren.

---

the adoption of other roles increased. This decrease is not as bad as it sounds since, as students address the points of others by asking for more explanations, they make fewer independent points resulting in more meaningful debate with fewer but deeper parallel threads as Table 10 illustrates.

Nevertheless, as Beth (NS) points out, some points don't get followed up. In Table 7 Ruth (NNS) discussing the role of the tutor comments, "He also has to encourage participation to the three ways of talking elaborated by Mercer i.e. disputational talk, communicative (sic.) talk as well as exploratory talk. Do you agree on that?", she did not receive an answer to this and, moreover it should have been challenged since the paper advocates encouraging exploratory talk rather than disputational or cumulative talk alone. Thus, even when the chat becomes more focused it is still difficult for the tutor to notice and address all the points that need addressing. This is especially true of minor grammatical and spelling errors which occur frequently due to the pace of the dialog. On the other hand, as the quality of the debate improves it is more likely that the students themselves will challenge each other's points constructively, and there is evidence of some self-correction on minor points of English, e.g., Shirley in Table 10.

## Summary and conclusions

Small-group collaborative learning in which students have opportunity for critical discussion is a key element of effective teaching and learning in Higher Education. Such opportunities to interact with the tutor and with each other are said to develop students' abilities to reason in a specialist subject. Providing this sort of education through networked learning environments is challenging for tutors. Moreover, networked learning often presents other challenges. In this case study, students who were distant, local, native (NS) or non-native speakers (NNS) of the target language had to collaborate together in groups and produce joint products.

Computer Mediated Communication (CMC) in networked virtual learning environments offers advantages as well as disadvantages for such collaborative forms of learning. Research in analyzing CMC is revealing that facilitating effective discussions depends on encouraging students to take many different roles. Our hypothesis was that asking students to reflect on the kinds of role they should take in discussion would encourage wider adoption of these roles.

Initial results showed that NNS and NS, distance and face-to-face students working together collaboratively through the VLE had very comparable outcomes on essay assignments – the key learning performance indicator for this course. Moreover, NSS and distance learners slightly outperformed

face-to-face students in their formatively assessed collaborative group work. Overall NNS students made more use of the communication tools than NS students and distance NNS made more use than face-to-face NNS. The need for distance learners to use the VLE to communicate with the tutor and for group-work meant that they were more likely to access communication tools pages and take part in chat debates on a regular basis. Given that distance learners (totally reliant on the VLE for their course delivery), had comparable results with those attending classes, networked learning would seem to have succeeded in meeting the objectives of the course.

There was also support for the hypothesis that raising student awareness of roles and encouraging them to take these roles results in (at least some) students taking these roles more often within synchronous discussion, and that this can raise the quality of discussion.

It was noted that some (mainly infrequently attending) students did not improve their role-taking whilst others did so only for the duration of the role-taking exercise, 'slipping back' to near previous levels later. Moreover, students in the mainly NS group did not continue to take responsibility for focusing the debate after the role-taking exercise finished and some of the benefits to the dialog may then have been lost. This indicates that the management of the focus role had not been fully adopted as an independent discussion skill. One problem might be that students had a strong expectation that the tutor would focus the debate. Tutors do feel it is part of their responsibility to keep students on track and it may be difficult to relinquish control sufficiently to encourage students to practice these skills for themselves.

It is also likely that had students been instructed to take roles over more weeks, and if additional special responsibility roles had rotated around students so that all students explicitly practiced being responsible for all roles, then the effects would have been more marked and sustained.

The role-taking exercise did, however, demonstrate that, by using the technique, the quality of synchronous CMC debate can be improved. Over time there were fewer independent points being made that were not critically addressed by others in the group. This gave the impression of a more coherent, focused and deeper debate. Moreover, the chat remained motivating as a medium for expressing ideas about the subject matter, as Olive said, it can be "all so inviting! And fun".

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## Note

1. WebCT: for more information see URL: <http://www.webct.com/retrieved> on 15/01/02.

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## Chapter 5

### Undergraduate students' experiences of networked learning in UK higher education: A survey-based study

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**Abstract.** This chapter reports findings from a study of networked learning at the undergraduate level. It focuses on students' expectations about, and experiences of, networked learning. 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 the use of communications technology 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

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, Johnson & Goodyear, 1992; Hodgson & McConnell, 1992 and see also the collections by Mason & Kaye, 1989 and 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 categorizing and analyzing networked learning texts have been described and exemplified by Henri (1992), Howell-Richardson and Mellar (1996), Mowrer (1996), Zhu (1998), Hara, Bonk and Angeli (2000), and De Laat and Lally (2004). Early work in the field was often, implicitly or explicitly, oriented toward 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 (De Laat & Lally, 2004; Booth & Hulten, 2004).

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 & 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. (1991) 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 & 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, Asensio and Goodyear (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 & King, 1998; McConnell, 2000; Coomey & 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. Thirdly, 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 stu-

dents. 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 chapter 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 & 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 toward 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 & Bloxham (2001) and Jones & Asensio (2001). This paper mainly reports 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 flavor. 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 postgraduates), 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-center campus, with the course in question being taught in a purpose-built center 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 Website, 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-center 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 co-ordinate 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 (Q1) 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 anonymized 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 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

*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 five-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 future tense)	✓	✓
3a	The 52-item version of the ASSIST Approaches to Study Inventory (Tait & 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 nine-point scale on which to record an answer, ranging from 'very well' to 'rather badly'	✓	✓
6	Responses to 17 five-point Likert items tapping students' views about their recent course experience		✓
7	Eight five-point Likert items tapping students' beliefs about learning		✓

*Table 2.* Breakdown of dataset by university/course

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

toward the end of the course and returns for Q2 were supplemented by online returns of questionnaires e-mailed 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 A1 in the Appendix. 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 skepticism about the use of the technology. There is no obvious connection between this more skeptical 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 skepticism. 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 focusing 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 A1 suggests the following interpretation of the four components.

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 (items 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).

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 3 helps us 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, 3 and 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 student’s self-evaluation of how well they thought they were doing in their assessed work to date.

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
	Std. deviation	0.73	1.20	0.76	1.08
Ed Tech	Mean	0.32	1.14	1.27	0.54
	N	30	31	31	30
	Std. deviation	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
	Std. deviation	0.72	0.82	1.02	0.65
Study Skills	Mean	0.60	0.14	1.75	0.29
	N	80	83	85	84
	Std. deviation	0.77	1.09	0.58	0.84
Total	Mean	0.58	0.67	1.47	0.52
	N	239	245	247	243
	Std. deviation	0.77	1.08	0.85	0.97

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 center 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

*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
	<i>N</i>	91	93	93	91
	Std. deviation	0.82	0.78	1.02	1.05
Female	Mean	0.58	0.41	1.61	0.48
	<i>N</i>	147	150	152	150
	Std. deviation	0.75	1.15	0.70	0.91
Total	Mean	0.58	0.68	1.46	0.52
	<i>N</i>	238	243	245	241
	Std. deviation	0.77	1.08	0.85	0.97

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 e-mail, 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 e-mail, 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 e-mail 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

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	COMPEXP	C1 worth	C2 confidence	C3 utility	C4 interest
AGE	Pearson $r$	1	0.171	0.236	0.083	-0.202	0.304
	Sig. (2-tailed) *		**	***		**	***
	$N$	240	240	233	238	240	236
COMPEXP	Pearson $r$	0.171	1	0.234	0.477	-0.195	0.252
	Sig. (2-tailed) **			***	***	**	***
	$N$	240	247	239	245	247	243

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 & Entwistle, 1996; Entwistle, Tait & McCune, 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 labeled 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

*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-evaluation
1	Worthwhileness	Pearson $r$	0.173	0.089	-0.454	0.076
		Sig. (2-tailed)	**		***	0
		$N$	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

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 summarize 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' judgments 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 (i.e., 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 flavor 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-organization 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 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 Web site 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. 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 (Q1) and experiences (Q2) by drawing on a reduced dataset – that which includes only the students for whom we have both Q1 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 A2 in the Appendix. (Note: these 17 items are labeled Q2.1 to Q2.17 to distinguish them from the set of 23 Likert items we introduced earlier, which we label simply items 1–23.) The overall impression given by the data in Table A2 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 focusing 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 2.3).

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 labeled 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

*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		

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 co-operate 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 the Appendix as Table A1, on both questionnaires. The items were presented in the same order on each questionnaire. Those on Questionnaire 1 were worded exactly as in Table A2. 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 ( $Q2 - Q1$ ), for each of the 23 Likert items for this reduced data set can be found in the final three columns of Table A1.

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  $p = 0.05$ ).

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 shifted *toward* 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

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

		Q1 mean	Q2 mean	Change Q1 to 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

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&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 toward 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&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&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 analyzed 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 stu-

dents 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 research study 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

artifact 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 & Lally, 2004). 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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## Appendix (Tables A1 and A2)

Table A.1. 23 Likert items presented in Questionnaire 1 (Q1) and Questionnaire 2 (Q2)

		Q1			Q1 to Q2( <i>n</i> = 119)		
		<i>n</i>	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

Table A.1. (continued)

		Q1			Q1 to Q2 ( <i>n</i> = 119)		
		<i>n</i>	Mean	SD	Mean1	Mean2	Diff
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
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

Table A.2. 17 Likert items from Q2 with means and SDs

		<i>N</i>	Mean	Std. deviation
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 <i>N</i> (listwise)		182		

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 data linked at the level of the individual student. Mean1 and Mean2 are the mean responses for this dataset on the start and end of course questionnaires respectively. Diff is Mean2 – Mean 1 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.

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## Chapter 6

### Stimulating professional development through CMC – A case study of networked learning and initial teacher education

MARIA ZENIOS, FRANK BANKS & BOB MOON

**Abstract.** This chapter explores the use of networked learning, and especially asynchronous text-based computer conferencing, in stimulating teacher professional development. The study is located within the broader context of sociocultural theory and in particular the work of Lave and Wenger (1991), which locates learning in forms of co-participation. The results of the study indicate that the form of networked learning within educational contexts is crucially influenced by three key factors. (a) The way in which computer conferencing is organized within the context of a formal course influences the form of professional discourse within the conferences. (b) The contrasting character of subject domains can be related to differences in the form and the style of discourse within the conferences. (c) The length of engagement of participants in computer conferencing influences their transition from novices to more experienced participants in networked learning processes. Within successful conferences, teachers' professional development can be stimulated in new ways, in particular through promoting reflection and enhancing learner autonomy. It is suggested that the role of the moderator is crucial in stimulating effective conferences through the structuring of the learning resources inherent in the conferences. In sum, this study develops a grounded understanding of teacher professional development as a socially situated process enabled through networked learning.

**Keywords:** CMC, moderation, networked learning, teacher education, teacher professional development

### Introduction

Computer-mediated communication (CMC), has the potential to contribute in innovative ways to professional development. Particular examples are seen in the area of teacher education where new opportunities for collaboration among learners can emerge (Schrum, 1992; Singletary & Anderson, 1995; Hall, 1997; Leach, 1997; Lewis et al., 1997; Moon, 1997). It has been suggested that CMC environments can provide forums for discussing aspects of teaching, developing common professional interests and raising concerns with colleagues (Pearson & Selinger, 1999).

The use of new interactive technologies such as CMC in teacher education is part of a much larger development of what some have termed the 'e-revolution'. Negroponte (1995), argued that computers, being no longer



the exclusive domain of the military, government and business, would increasingly be used by very creative individuals at all levels of society. There has been a rapid growth in the number of people on the Internet since the mid-90s, from 30 million in December 1996 to 600 million in November 2002 (Nua Internet Surveys, 2002). The rapid growth of computer ownership, along with the ability of computers to combine and transfer a great deal of information through networks, at ever increasing speeds, have contributed to the technological, social and economic transformation of communities. Castells (1999), considers this no less than the genesis of a new age, the information technology age, in which power, wealth and culture depend on the technological capacity of societies.

The emergence of the so-called information technology age requires people to develop the skills of accessing information and of communicating throughout the world in order to be able to understand and to change that world. It is in these specific tasks, that information technology and networking are becoming the center of the new social structure:

Information technology became the indispensable tool for the effective implementation of processes of socio-economic restructuring. Particularly important was its role in allowing the development of networking as a dynamic, self-expanding form of organisation of human activity. This prevailing, networking logic transforms all domains of social and economic life (Castells, 1999, pp. 356–357).

Governments see education, through schooling and lifelong learning, needing to be at the core of the knowledge and network revolution. For example, in 2000, the European Commission brought together a number of strategic action areas in order to develop networked centers for acquiring knowledge through the implementation of CMC technologies. This initiative encourages the networking of universities, schools and cultural resource centers and it favors sharing of best practice in education and distance learning. The incorporation of CMC technologies in education is seen as a fundamental prerequisite in the construction of a dynamic, competitive and economically powerful society (Commission of the European Communities, 2000).

In a related vein, participants in a recent UK Economic and Social Research Council (ESRC) research seminar series (March 2000–March 2002) launched a manifesto toward quality in networked learning in higher education, which argues for the need to provide models of learning that are based on participation rather than transmission, implying a redefinition of the relationship between teacher and learner and pointing to the potential of networked learning for widening access and promoting social inclusion (E-Quality Network, 2002).

Such developments suggest a pressing need to conduct research on the implementation of networked technologies in teacher education programmes. This case study explores the role of computer conferencing in initial teacher professional development and it aims:

- 1) to identify the key factors that crucially influence the form by which networked learning evolves in teacher education,
- 2) to explore the new ways in which networked learning promotes teacher professional development and
- 3) to define the role of the moderator in stimulating effective conferences.

Among these assumptions, this chapter develops a grounded understanding of teacher professional development as a dynamic, socially situated process enabled through networked learning. The aim is to stimulate debate around an important area, not least in providing a stronger theoretical framework against which networked learning initiatives in teacher education can be described, analyzed and critiqued.

## **Theoretical framework**

A sociocultural approach is adopted for this study based on the claim that it provides certain recommendations for understanding learning that enrich previous research on professional development. These recommendations, in particular, provide a guide about what to pay attention to, in thinking about teacher professional development. The term 'community of practice' implies participation in a system through which learners share understandings concerning what they are involved with and what that means in their lives and for their communities. In that sense, the community of practice constitutes a set of relations between persons, activity and the wider world (Lave & Wenger, 1991). The sociocultural theory of learning starts with the assumption that engagement with the practices of a community develops learning. In that sense, learning is by no means an individual process separated from the context of the lived experience of participation in the world.

The process of participation in the community of practice permits access to learning resources through involvement in shared activities. The learning resources comprise the learning curriculum which is a characteristic of a community of practice and it is designed by the learners in contrast to a teaching curriculum (Lave & Wenger, 1991). On this view, learning is not achieved by acquiring knowledge transmitted through instruction, but rather it occurs through increasing participation in the community of practice. An important element for increasing participation is the transparency of the organization of practice and the resources used in the process. The notion of transparency

refers to the ability of the participants to make sense of everything that is engaged in the process.

Within the community of practice, the master is not the central figure or the dominant participant. Being a facilitator of learning, the master allows the participants to move and be moved from peripheral to more central forms of participation within the community of practice. In this way the master enables participants to become full members with growing responsibility within the community (Lave & Wenger, 1991).

The construction of identities is a component of the process of being an active participant in the sociocultural practices of the community of practice. Communities of practice can be reflective, allowing members to produce models that trigger new interpretations and absorb new perspectives that allow members to transform their identities.

In this study the concepts of communities of practice and reflective practice are brought together. Schon's (1983, 1987), framework for reflective practice has been an influential theoretical account of professional teaching. Schon's work stresses the fact that mastery of knowledge on its own is not sufficient for successful professional practice. In an important sense all situations, all classrooms, are unique. Unique problems present themselves with a multitude of variations to which professionals need to provide specific responses. Such situations frequently involve various judgments and decisions in situations of ambiguity and uncertainty. In this view, reflection as a means of evaluation and self-criticism is considered as important for teachers because it enables them to work out solutions in conditions of uncertainty (Tickle, 1994).

The concept of identity is relevant to reflection because it involves the ability to select information and knowledge that is useful and meaningful to a person. This ability permits individuals to take charge of their actions in the course of addressing significant issues. The freedom of the student to act independently without the control or the influence of the tutor leads to autonomy. Calderhead and Shorrock (1997) suggest that reflection promotes learner autonomy since it enables student teachers to take control over their own professional development by analyzing and evaluating their practice.

This case study investigates networked professional development in initial teacher education through CMC. Three main sets of ideas developed in the course of the research:

(i) The form of networked learning within educational contexts is crucially influenced by three key factors: (a) the way in which computer conferencing is organized within the context of a formal course influences the character of professional discourse within the conferences, (b) the organization of the conferences around different subject domains can be related to differences

in the form and the style of discourse within the conferences and (c) the length of engagement of the participants in computer conferencing influences their transition from novices to more experienced participants in networked learning processes.

(ii) Key aspects of professional development, particularly learner autonomy and reflective practice, can be stimulated in new ways through networked learning, especially through the new forms of reflection created within conferences.

(iii) The role of the moderator is crucial in stimulating effective conferences through the structuring of the learning resources inherent in the conferences.

Each of these three themes is examined in more detail later in the chapter. First, we describe the study context and research methods.

## **The context**

The study focuses on the UK Open University Post Graduate Course in Education (OU PGCE), which is the largest pre-service teacher training programme in Europe. It is provided by the Open University, a distance learning institution that has been a model in providing distance learning programmes and utilizing new technologies. The OU PGCE is a part-time distance learning course provided for graduates and leads, on successful completion, to Qualified Teacher Status (QTS).

CMC among students and academic staff is enabled by using 'FirstClass', a computer conferencing system that has been developed by the Canadian company 'SoftArc'. Students are loaned a computer, a modem and a printer for the life of the course. They are able to use this equipment from home for all aspects of the course including computer conferencing. The computer conferencing system enables users to exchange messages and it allows them to sort, organize, store and retrieve the messages sent. Additionally, the environment enables users to visualize the status and nature of messages in a helpful way. For example, special icons such as 'flags', indicate when a user has received a new message. The 'thread' feature allows readers to follow an argument through a sequence of messages even when they have been submitted at very different times, while the 'history' feature permits one to find out who has read or responded to a message. The 'resumé' function allows participants to circulate their biographies if they wish to.

This study investigates the use of CMC in five conferences provided for students who were training to be teachers of secondary school science, secondary school English or for teaching in primary school. Each conference

consisted of a main subject 'conference room', a bulletin board, an archive of the older messages and a number of specialist sub-conferences.

## Methods

A case study approach was adopted in order to provide a comprehensive view of CMC and to enable more in-depth probing of networked learning. The study employed non-participant observation of CMC conversations and analyses of qualitative interviews. In total, five computer conferences were observed, in which 11,523 messages were posted. The three guiding ideas set up the immediate agenda for research and enabled data collection and analysis. The following preliminary questions gave a focus to the data collection:

- Which topics were discussed in the conferences?
- Were there any differences among subject conferences? If so, what?
- How did the participants' contributions vary during the course?
- How were reflective practice and learner autonomy stimulated within the conferences?
- What roles did the moderators have within the conferences?

The study used an analytical framework in order to illuminate the data collection and analysis steps. Initially, the information derived from the earlier stages of the conference observation was used as a rudimentary conceptual framework, which provided a notion about message grouping. Data that provided incidents illustrating these themes of focus were collected with an eye to seeing the diversity of the dimensions under those themes. Finally, the scrutiny of the computer conferencing messages enabled classification into five categories depending on the message purpose. The purpose of each message indicates the intention of the person who composed and sent the message to the conference. These categories are:

1. Asking for support and help
2. Checking understanding
3. Giving feedback
4. Sharing new information
5. Reflecting

From this analysis, the fifth category: 'reflecting' was picked up. The categorization of the 'reflecting' messages included an evaluation of the educational quality of the content of these electronic messages. Each message falling under the label of 'reflecting' was collected and then rated on a four-point reflection scale based on a previous scale proposed by Bain et al. (1999). The Bain scale was revised and transformed to a scale that fitted with the particularities of electronic communication:

- a) Responding: the student discusses an incident
- b) Relating: the student gives superficial explanations
- c) Reasoning: the student analyzes a concept or an event
- d) Reconstructing: the student shows a high level of abstract thinking

The establishment of the above categories allowed the systematic analysis of the data. The basic structure of the classified items was brought out through multiple readings and persistent analysis. The use of notebooks in order to track developing ideas and increasing linkages enabled the development of the theory through subsequent processes of data collection and analysis.

The information from the conferences was triangulated with interviews with 41 students who participated in the conferences and 8 conference moderators. The contribution of key informants has been valuable to the research, since they provided corroborating evidence which strengthened the beliefs obtained through conference observation.

The moderators were interviewed face-to-face, whereas the students were interviewed remotely, either by telephone or through the use of audio logs, because they were widely geographically scattered. The audio log technique allows the interviewees to answer the questions posed by the interviewer in their own time, using a self-recorded audio cassette tape. The data collected from self-recorded audio logs compared favorably with that collected by the telephone. It enabled gathering of more substantial data, in both quantity and quality, than would otherwise have been possible. The comments of the interviewees who used the audio logs were longer and more insightful than the comments of those who used the telephone.

We now proceed to a discussion of each of the main themes which emerged from the study: influences on the form of networked learning; evidence of learning processes of particular relevance to professional development in an online community and the importance of the role of moderator. The next three sections discuss each of these themes in turn.

### **The form of networked learning in teacher education**

The evidence from the case study suggests that there are three main factors that appear to influence the form by which networked learning evolved in the OU PGCE course. These seem to be related to: (1) the way in which conferencing was organized within the context of the course, (2) the contrasting character of the subject domains around which conferencing was organized and (3) the length of engagement of the participants in conferencing. We consider each factor in turn:

*The organization of computer conferencing within the context of the course*

Evidence suggests that computer conferencing has been an integral part of the course. Conferences performed an important function, providing support for the students in four distinct ways: (a) provision of information about the course processes and structure, (b) enhancement of students' understanding of the course requirements, (c) development of students' subject knowledge and (d) support of students during their teaching practice. The discourse on the course processes and requirements was mainly concerned with transmission of information and clarification of procedures. In contrast, the discussions that involved subject knowledge and teaching practice were rather more discursive and expansive in nature.

Discussions on the processes of the course were necessary because the course procedures often changed, due to government requirements, and students needed to be informed frequently about possible modifications and enhancements. Information about the course procedures was sent to the "Bulletin Boards", which were created in each of the conferences.

The conferences enhanced students' understanding of the course requirements and offered them reassurance from their peers. The participants worked in a non-threatening environment as they could expose their ignorance about aspects of the course requirements without anyone assessing their contributions. Discussions on course requirements were organized in special rooms created within the conferences in order to keep all related messages in the same place. All 41 students interviewed said that they discussed issues related to their own assessment with tutors and peer students within the conferences. The following extract illustrates the contribution of the discussions to the completion of the professional development portfolio. (Note: false names have been used to protect the identities of the participants. The text of the conference extracts is reproduced verbatim and includes errors from the original entries. Conference extracts are presented in italics. Segments of interview transcripts are presented in normal type.)

*My portfolio has finally gone – after having to correct most of the pages as I'd transposed the last two numbers of my PI – and written them on all sheets!*

*I'd like to say a big thank you to everyone, I've used a lot of material that has been put up on this (and other conferences) and I couldn't have managed without it. The only problem is that I didn't record who I got what from so I hope those of you reading this will know how grateful I am for the worksheets, lesson plans, contents pages and advice.*

*Thank you all and good luck in the future.*

*Penny*

Extract 1: Acknowledgment of contribution of CMC discussion to construction of portfolio

One of the aims of the conferences has been the development of students' subject knowledge. Sixteen out of 41 students interviewed mentioned that they participated in subject knowledge discussions and their importance was recognized by the moderators.

I was looking for clarification or a very clear explanation of the difference between weight and gravity [in the science conference]. Since it was part of my updating subject knowledge, I was trying to develop a resource which I can be able to use so, that I could make it very clear to students what are the differences between weight and gravity. (Patricia Noble.)

A lot of discussions have been related to improving subject knowledge and meeting the standards required for a qualified teacher status. (Marie Hunley.)

We thought it was very important to have subject knowledge conferences, so we've got the Maths subject knowledge discussion conference and the English subject knowledge discussion conference. (Sally Webb, conference moderator.)

The exchange of resources within the conferences has contributed toward the development of the participants' subject knowledge. Resources like academic papers, Web addresses and a series of books helped participants to develop specific interests within their subject areas. Most importantly, the participants asked their own questions, set out their personal positions on teaching issues and made connections with school experience. This debate included a sharing of resources used in teaching practice, e.g. lesson plans, knowledge of CD-ROMs, textbook series and educational audio-visual material.

Thirty-six students out of 41 interviewed said that computer conferencing offered them ideas on teaching, which they would adapt and use while lesson planning:

Certainly when we were on teaching practice it was absolutely invaluable because, you know, you do lesson planning and you are being observed, you needed some particular resources, some idea of how to start off. If you put up, you know, 'a help', 'a plea', 'can you help me' there was always somebody who replied. I thought that was really good. (Joanna Young.)



The support has been phenomenal and very useful indeed. I don't think I would have done as well as I have. (Vivien Hutchinson.)

The following extract, which is taken from the Science conference, is an example of asking for ideas for a particular project.

*Over the next few weeks I will be working on an education liaison project between the local water authority and the department of education, here on the Isle of Man. My role is to come up with ideas and designs for educational resources that can be used in conjunction with class visits to the reservoirs and water treatment works, and with follow-up classroom activities (KS3 & KS4). The water authority here is only responsible for water supplies, not sewage treatment, so my initial ideas have centered around the water cycle (in KS2 NC PoS, but seems to crop up on later schemes of work too) and on links between treatment and separating mixtures (coagulation, settling, filtration etc.).*

*I have got some ideas from educational packs supplied by Severn Trent, North west, and Bristol water authorities, but would be interested to hear any ideas people have about simple classroom or field exercises that could be used. I would also be interested to hear to what extent such water related topics are being taught at KS3 and KS4 in other schools.*

*Karen*

Extract 2: Example request for ideas

A student replied to the message shown in Extract 2, offering ideas and comments and at the same time asking for more information about the project, aiming to find out where the emphasis was and whether there was access to audio-visual facilities within the school. Feedback was given and then the student came back in a long message explaining a fluorescent staining technique in detail, demonstrating a number of relevant tests and suggesting student activities. The student who had initially asked for ideas appreciated the response.

The exchange of teaching ideas and lesson plans was considered as useful, especially because of the realization that the ideas came from peers who worked under similar conditions to themselves:

*I think [I gained from conferencing] specific tips and ideas to use in lessons, practical things that other students have done. It's the feeling that they have done it today and it worked. That's quite inspiring more so than sometimes reading it in a book by an expert. (Celia Price.)*

This study supports the view that CMC, as a part of this particular course, offered students a wider perspective on their teaching in two ways. Firstly,

it gave the students fuller and more detailed feedback and contact with their peers than a conventional face-to-face course, because they could talk directly to all of them simultaneously. Secondly, the way in which conferencing was organized within the course enabled students to gain experiences from a range of different schools throughout the country. The following extracts are taken from the interviews with the students:

Even though you are limited to two schools for your own [teaching] experience you get information from other people who are in a different situation. (Claire Hall.)

You can talk directly to all of them [students and tutors] simultaneously rather than perhaps if you're in an ordinary PGCE course you might talk to a sort of a much smaller group of closer friends. So, I feel you get a much wider perspective. (Alison Edwards.)

The sharing of the experiences gained in real classroom situations among teachers contributes to their development (Brown & McIntyre, 1993; Craft, 1996; Calderhead & Shorrock, 1997). Discussions on teaching are considered as valuable experiences for teachers that help them construct their individual pedagogical profiles. Networked learning seems to offer teachers opportunities to think about and to discuss with peers their choices and their actions and explain why, in their own understanding, they chose to act in particular ways.

### *The organization of computer conferencing around different subject domains*

The evidence from the case study suggested that the form and the style of discourse differed markedly between conferences in different subject domains. The nature and the content of each discipline determined the character of each one of the subject conferences examined: science and English. The nature of the problems explored by the students within each discipline and the technical language used provided a different atmosphere within each subject conference. Similarly, the perspectives of the conference participants and their notions of practice within their specialties influenced the form and style of discourse within the subject conferences. The extracts that follow illustrate the contrasting character of the subject conferences. Extract 3 is from a science conference. Extracts 4a and 4b are from an English conference.

*Hello all,*

*Well, i had my first CASE lesson. Very interesting. The activities really motivated my Year 7's.*

*Activities were: Using a Newtonmeter to measure the force required to*

*raise varying weights. Children had to define the input and output variables, take readings and try to establish a relationship between them.*

*Using various containers of differing diameters and pouring the same volume of water into each and measuring the height of the water in each container. Children had to identify I/O variables and state if there is a relationship and if so the nature.*

*A data analysis worksheet where the children had data on several children re their height and weight. They had to establish a relationship by rearranging the data. In most cases the children realised that there was, in fact, no relationship.*

*I was fascinated to learn that there was a wide range in the stage of cognitive development in my class and that cognitive development was at variance with reading age.*

*The great thing was, was that i was able to refer back to the CASE lesson when helping one of my pupils in a subsequent normal science lesson. He grasped the idea instantly.*

*I've got more CASE lessons to do.....i'll let you have feedback then*

Extract 3: Science conference message

*The process through which we enjoy literature and language surely enables us to interact with ourselves and our surroundings in a way that feels more vital because it teaches us to question. That's what I think English is.*

*I loved maths – but it never taught me to question!*

Extract 4a: English conference message

*Hi Sandra — hope you don't mind a primary English bod butting in here? I have just had a rather passionate conversation with a close friend today, who cannot understand why, although I enjoy teaching both maths and English, I cannot find the same affinity for maths as I do language. She feels that it is the pure joy one feels when looking at the pattern of maths, understanding it, and then getting it so definitely right that makes maths so special. I conversely feel that it is because maths can be so 'right or wrong', it limits the whole subject for me. To me the essence of appreciating and creating in 'language' is what it's all about, and the fact that you can make your 'answer' individual and unique – so long as you substantiate your view. As a child I revelled in trying to find a 'new slant' on a topic, or come up with a different answer than the 'expected' one – and found much scope for this in English, but very little in maths. There is also that 'extra dimension' to English, in that as well as being a 'subject' in its own right – it also gives us access to not only the rest of the curriculum, but to the world 'outside' and all our relationships within it.*

*It's a good job that there are those of us who feel this way, and others as dedicated to other subjects, or life would be so dull! Sorry for the length of this message – got a bit carried away!*

Extract 4b: English conference message

The diversity in the backgrounds of the science conference participants, being physicists, chemists, biologists, environmental scientists or engineers, enriched the on-going discussion as it allowed a broader perspective on science education problems. The sharing of knowledge and the exchange of teaching ideas made online interaction meaningful and allowed the formulation of a sense of a community in which participants were experts in their particular subject domain (such as chemistry) but novices in other areas of science. The moderator of the science conference describes how science students from different specialties collaborated:

If a biologist is asking an A level standard question, or something in their degree, I'd rely on other biologists to answer that. If it's somebody who's a biologist who's asking for chemistry or physics that they had to teach in other words outside their own specialty to lower school pupils, well I can respond but others often do as well. [...] Very frequently the question of how to teach energy comes up and it's something that applies to all three sciences and there are clear strategies for teaching that are common in many schools. [...] students themselves often reply to other students suggesting ways that can be done. (John Jackson, conference moderator.)

The observation of the science conferences indicates that a common understanding of the nature of teaching and learning science was shared among science student teachers, possibly related to the view that science, as opposed to English, has a well-defined scope and content (Stodolsky, 1993). As the aims and the boundaries of the science subjects can more readily be defined, teachers were more likely to agree on what should be taught in schools and which methods and strategies should be used in the classroom.

In contrast, there were different views as to the content of the English to be taught at schools, and the teaching strategies employed among English student teachers, even though they had less variation in their areas of expertise than the science conference participants. This was particularly evident in discussions concerning the selection of poetry and literature for teaching in schools, as well as in the initiation of debates on media, films and cross-cultural issues. The following extract is one of the 19 messages contributed to a discussion on the nature of English as a school subject.

*Oh this is going to spark some interesting debate! I'm determined not to confuse English with teaching here, but I can't help seeing English as*

*fundamental to moral and spiritual growth. I suppose, bearing in mind the supposition of Marenbon in app 2 of block 6 about practical criticism becoming an end in itself and that being well read isn't necessarily a prerequisite for goodness, that appreciating the richness of literature and the heritage of our language and the skills with which we explore them is crucial for me. I use appreciating the richness of literature to mean enjoying the experience on a fundamental level because the narrative or characters are pleasurable or conversely because it is challenging' (i.e., Cormack McCarthy's Blood Meridian, which I have just read, has no protagonist to get close to, but the language choices and effects are startling). And the appreciation through ideological/moral/social/historical/multi-cultural context. The process through which we enjoy literature and language surely enables us to interact with ourselves and our surroundings in a way that feels more vital because it teaches us to question.*

Extract 5: On the nature of English as a school subject

These findings reflect the views of Grossman (1993) who points out that English is an area with a diversity of classroom objectives and procedures. In that sense, the theoretical perspectives about English as a subject held by teachers can be different.

### *The length of engagement of the participants in computer conferencing*

Lastly, evidence indicated that computer conferencing involved a transition of the conference participants from novice users of computer conferencing to more experienced participants in networked learning processes. This transition was a long and gradual process and it involved change and transformation in the following functions: (a) using the technology, (b) finding useful and relevant information from the conferences, (c) conducting online discussion and (d) thinking collectively about subject knowledge and relating this knowledge with teaching practice.

Twelve interviewees out of 41 mentioned that they had experienced difficulties with computer conferencing at the beginning, which they overcame gradually. All interviewees said that they felt confident with the use of computer conferencing towards the end of the course. A few students said that as a result of their engagement with CMC, they felt confident about utilizing the Internet and e-mail within the classroom. One of the interviewees described their experience with the process of coming to grips with the technology:

It was really the mechanics to understand it. I had to go through the manual, the leaflets and the booklets that explain how to use it and then to use it in practice. I eventually got into it. (David Staley.)

*Table 1. The longest threads of discussions about teaching*

Conference room	Topic of discussion	Timing in year	Number of messages sent
Literacy hour	Synthetic phonics	February–March	19
	Persuasive writing	May	7
	Literacy hour/yr 1	May	12
	Literacy hour in reception	April	12
	Shared writing	April–June	12
Teaching literacy	ICT in the literacy hour	February	11
	Individual reading	February–March	18
	Guided reading	February–March	24
Online seminars	Assessment in the literacy hour	February–April	21
	Phonic experiences	March	12
Numeracy	Mental maths	December–August	21
Strategy	Investigative maths	February	14
Science	Reflex arc	May	15

The progression of the conferences over their life span dynamically shaped this transition. The length of engagement of the participants had an impact on the extent of the threads of the on-going discussions and the focus and the orientation of the messages exchanged. The participants' confidence in sending messages and downloading attachments enabled them to conduct on-line discussions and finally to think collectively about subject knowledge and relate this to teaching practice. Consequently, as a result of students' technological improvement, the online discussions became longer and were oriented toward more sophisticated topics of discussion such as Literacy Hour in the classroom, assessment and ICT (Information and Communication Technologies). Table 1 shows the timing of the longest threads of discussions during the academic year.

It is evident from the topics of discussion shown in Table 1 that the student teachers were engaged in an analysis of the possible ways in which they could teach particular subjects, especially reading and literacy. It was only toward the later stages of the conferences when students were confident with networked processes that they could think collectively about their subject knowledge and the new knowledge offered by the course and they could relate this knowledge with their teaching practice experiences.

On this basis, it can be concluded that the form of networked learning in teacher education can be influenced by three key factors:

Table 2. Message classification system

Category	Description	Examples
Asking for help	Requesting ideas on teaching and solutions to specific problems. Requesting personal support when stressed	"Has anybody come across any good stories relating to any one of the senses that would work for a Reception Class?" (Primary, 8/5/98)
Checking understanding	Referring to course processes and assessment and drawing from the conference threads in order to promote understanding	"I had understood Plan as in the assessment guide to mean a detailed medium term plan. Am I correct, or is what is required for the portfolio detailed session plans . . . ." (Primary, 15/3/98)
Giving feedback	Responding to messages requesting help	"Get them in groups brainstorming ideas on these problems . . . Provide text books and other self-research resources (if you can-or generate them yourself in the form of data sheets etc) . . . ." (Science, 1/6/98)
Sharing information	Exchanging information about educational television programmes, IT resources, books, research papers, exhibitions and seminars	"The Institute of Biology's Journal of Biological Education is being relaunched this year and is aimed at those involved in teaching biology . . . ." (Science, 3/6/98)
Reflection	Reflecting on teaching practice, questioning actions and ideas and analyzing concepts	"I was fascinated to learn that there was a wide range in the stage of cognitive development in my class and that cognitive development was at variance with reading age . . . ." (Science, 2/4/98)

- a) The way in which computer conferencing is organized within the context of a formal course influences the form of professional discourse within the conferences.
- b) The contrasting character of the subject domains can be related to differences in the form and the style of discourse within the conferences.
- c) The length of engagement of the participants in computer conferencing influences their transition from novices to more experienced participants in networked learning processes.

### Networked professional development through CMC

This section discusses three key aspects of the learning activity within the conferences examined: (1) collaborative learning, (2) reflective practice and (3) learner autonomy.

### *Collaborative learning*

The conference participants were engaged in sharing of information, experience and ideas through reading contributions from each other and writing their own representations of teaching theory and practice. Collaboration has been a central activity within the conferences and this has been demonstrated by all 41 students interviewed. Table 2 shows a message classification system, which indicates the ways in which the participants worked jointly online.

The online discussions were oriented to real problems in real contexts arising from the students' study and teaching experience. For example, two students said:

[We discussed] problems we were having with particular curriculum areas, [...] ideas about this, that or the other. On the Primary conference, we discussed a huge variety of different issues, depending on what we were doing. If we were teaching then they would be about how to deal with something in teaching and if we were near TMAs [Tutor Marked Assignments] then it would be something to do with that or it would be to do with portfolio activities. So, almost anything really and I used it quite a lot. (Rosemary Watkinson.)

It's [computer conferencing] great for accessing resources or transmitting resources to help others on their course, it's just a problem sharing, a problem-solving network. (Belinda Davies.)

With conferencing you are not meeting face-to-face and I think people are far more willing to share personal things and ideas and they are quite happy to share their work, than I think students in a college situation face-to-face. (Francesca McKenzie.)

These interview extracts point to the existence of a support network among a large group of people, an online community of geographically dispersed student teachers, where members support each other and have a common goal. The palette of information and knowledge stored within the conferences constituted the learning curriculum of the communities of secondary and primary student teachers. The learning curriculum was shaped and enriched by the participants themselves who worked from a motivation which arose from their interests and concerns.

### *Reflective practice*

The CMC activity created an impetus to think deeply and enabled the participants to engage in reflective thinking. Extracts 6a and 6b highlight the way



in which students used computer conferencing as a tool for mental activities such as critical inquiry, analysis and judgment:

*The tale-telling one is difficult. My yr 7 class were always doing this, and mostly I just uttered platitudes and let them get one with it. However, as time went on, I realised that most of the tales were about one particular boy, who I had never seen do anything, but who was certainly seldom on-task. I decided that the best thing to do was to keep a closer eye on him and speak to this tutor (who just happened to be my mentor anyway). If I had been there longer I might have taken him aside and told him I knew what was going on.*

*I have found another dilemma with the younger pupils (I am teaching secondary). When starting something new, I was tending to do a Q&A session (diagnosis of prior learning etc.) and I found that often, lots of pupils wanted to contribute, but that their contributions were often slight digressions from what we were talking about. I wanted to give as many pupils as possible the chance to contribute, and to answer their questions, but the problem was that this took me off the track of what I was doing and prolonged these sessions to the detriment of the rest of the lesson.*

*I always want to encourage pupils' scientific interest and curiosity: how can I do this but keep the lesson on track at the same time?*

*Rowena*

*P.S. I thoroughly enjoyed SE2 but isn't it nice to have evenings and weekends back?*

Extract 6a: Online reflection and analysis

*I write from a secondary perspective (though I have a 5 y/o daughter who uses a computer at her school for about 5 minutes every two weeks – if she is lucky!) P2P;*

*I agree with Belinda – on the use of computers as labour savers, enabling more time to be spent on higher order skills such as analysing/evaluating. However, I do think they need to know how to collect/record the data manually, so they understand the process. I am not saying that just because I had to do all data collection/presentation manually, so should they, but I do think that an understanding of for example a graph represents, is increased by an understanding of how to draw one. Drawing one wrongly and finding that valid conclusions cannot be made from it, is an essential part of that learning – I really believe they learn better by doing it themselves and making their own mistakes. However, once the art of table and graph drawing has been mastered, I do not see why, if resources allowed, the computer should not be used, allowing more time to be spent analysing/evaluating.*

Extract 6b: Online reflection and analysis

The level of reflection within each computer conferencing message collected was rated on a four-point scale (see Table 3). The highest-level reflective messages generally focused around aspects of teaching experience and subject knowledge (see Table 4). They were oriented to discussions of teaching problems within the classroom and they often included an evaluation of possible ways to deal with sensitive or difficult situations. The participants argued about the ways in which they acted during their short teaching experience or imagined the ways in which they would function in the future by considering all the components of a problematic situation. The highest-level reflective messages were equally oriented toward exploring abstract concepts related to the participants' subject domains of interest.

Evidence suggests that students made their views on teaching practice accessible to their peers for further analysis. This collaborative process of researching and articulating responses to the questions raised enabled participants to think about themselves as teachers, to become aware of the ways in which they can understand their lives as developing teachers and to explore new possibilities on teaching. This ability corresponds to what Lave and Wenger refer to as 'educational imagination' – a form of reflection which allows learners to see the multiple ways in which they can interpret their practice.

### *Learner autonomy*

The students who participated in computer conferencing had control over the subject of their contributions and over the timing of the discussions and the pacing of their involvement. The themes initiated during the electronic interaction were related to the students' own context and their own professional goals (see Tables 1 and 4). One of the moderators said:

I think what makes it [conferencing] successful, is that it involves some of the things that the students have said, what they would like to talk more about, the subjects come from the students. (Imogen Roberts, conference moderator.)

This approach allowed participants to exhibit a substantial degree of autonomy and take responsibility for their own learning. Learner autonomy is interrelated with the development of a coherent professional identity, which itself involves the ability to select information and knowledge that is useful and meaningful to a person (Lave & Wenger, 1991). Through networked processes such as conferencing, the development of the learner's identity can be encouraged, as learners can focus on areas of interest:

Table 3. Four-point level of reflection scale (adapted from Bain et al., 1999)

Level of reflection	N*	Description	Examples
1. Responding	327	The student describes an incident or discusses an idea and makes judgments without giving any reasons for the judgment. Reports feelings	"... I have found the majority of children enjoying the reading of a text together. In the Year 1 class I had in SE2, there were several children who were at the 'play reading' stage, but they joined in with some of the words and by the end of the week were joining in with more. The text was pitched at the higher attainment level of the group and it really worked. Same with KS2 ... the ones who struggle with reading really were helped by reading with the fluent readers, as long as the text was interesting and 'cool' enough for those children concerned with street cred. Whole class guided writing - I think writing really can be helped by one of these sessions - with contributions from the class for a text written all together with the teacher as the scribe. In general the text is the element that matters - well-written real books that interest the children do so much for motivation ..." (Primary, 4/2/99)
2. Relating	252	The student identifies an area in which they have learned and gives superficial explanation of the reason why something has happened	"Most surprising - the amount of time it takes to get a Y7 class to do things. I started my SE2 in September and I wasn't prepared for the immaturity of Y7. I have discussed this with my daughter ... She tells me that ... On reflection, from my experience with both primary and secondary, I can see her point. Do we do expect a degree of independence and responsibility at secondary level that incoming Y7 are not prepared for? Surely this is a case for even more links at the transition phase. Learnt most from Y11 class. Set 2 of 5. I over-estimated their capabilities enormously. I arranged an activity where I gave them theory and apparatus and asked them to design an experiment to test a hypothesis. Only 2 out of 6 groups produced anything that you could call an experiment. The others were ... Next lesson was re-planned to go through things in more gentle easy stages. The result was a calm workmanlike atmosphere and a productive lesson." (Science, 24/11/98)

Table 3. (continued)

Level of reflection	N*	Description	Examples
3. Reasoning	76	The student seeks a deep understanding of why something has happened, explores or analyzes a concept or an event. Asks for questions and looks for answers	"... The thing is that language changes anyway. There are all sorts of verbs which have been invented from nouns in the past few years – I 'prioritise' for one ... The invented spellings are equally fascinating but provide us with different dilemmas about how we treat them. Alex described some good practice in responding to unconventional spelling. The thing is that although we tend to get anxious about spelling, it's a long-term learning area and needs to be catered for by providing support learning environment [e.g., key words on the word wall or whatever; or clusters of 'words we've found recently in our books and thought they were interesting'; or lists of words with a particular prefix being added on to the computer. ...] Then there are occasions when we teach particular spellings or regularities in ... and also we encourage individuals ..." (Primary English, 7/12/98)
4. Reconstructing	7	The student shows a high level of abstract thinking, generalizes from their experience, formulates a personal theory of teaching or takes a position on an issue	"... For me, the beauty of literature is the freedom of interpretation, if the text is left open then I am free to participate in its construction. I feel it is fundamentally wrong to impose our own values on pupils. Nothing can be quite so exhilarating as finding and sharing a valid, yet individual interpretation, finding links and putting together an analysis. Few of us take the same cultural and social experiences to a text and it never ceases to amaze me how pupils can offer readings which hadn't even crossed my mind. THIS is what excites me about literature, it has different meanings and values for different people. ... [B]asically, I feel every reader is deconstructing texts and putting together their own interpretation of events anyway and this is what makes it so special, it has something to offer everyone." (English, 19/3/99)

\* Number of messages belonging to this category

*Table 4.* Focus of level 3 and 4 reflective messages within the conferences observed

Science	Primary	English
Homework	Assessment of pupils	Assessment of pupils
Critique on a book	Classroom management	Critique on a book
Teaching project	Teaching reading/writing skills	Motivating pupils
Achieving continuity and progression	Teaching grammar (e.g., spelling, phonics, syllables)	Reading literature
Educational resources supply at schools	Guided/individual reading	Use of films in teaching
Gender differences in science lessons	Maths teaching approaches	Narrative and genre
ICT in science lessons	Independent learning	Character description/analysis
Dissection of animals' organs	Activities with infants	Dialect/accent
Physics subject knowledge	Teaching students of differentiated abilities/needs	Shakespeare and racism
Subject knowledge (Primary Science)	Collaborative work	Poetry and picture
	Literacy hour for special needs children	Nomination for poet laureate
	Dealing with difficult pupils	Skills and knowledge interdependent with English
	Dealing with pupils from various cultural backgrounds	
	Dealing with aggressive parents	
	Religion in relation to geographical position	

One of the positive aspects of conferencing though, is that it's quite compact. You can skim through all the different headings and find what is relevant to you so you don't need to spend ages going through something, which you don't think either is of use to you or is of interest to you. (Mary Williams.)

As Lave and Wenger further suggest, a person's identity also involves their ability to shape meanings and define forms of belonging in social contexts. This ability permits individuals to take charge of their actions and to act independently without the control of the tutor. The ability to act independently

is particularly important in allowing students' personal growth, and sets the skills required for life-long learning (Kremer-Hayon, 1998).

### *The production of online community*

This brief analysis suggests that networked learning offers rich and innovative ways to enhance teacher development. Processes such as reflective practice enabled within collaborative conferences characterize participation as a way of learning within a social context. Next we consider some characteristics of the conferences observed which are conducive to the emergence and production of online communities, namely: (i) learning possibilities, (ii) learning curriculum, (iii) transparency, (iv) membership and (v) increasing participation.

### *Learning possibilities*

Conferences created a forum of learning possibilities by enabling participants to access people and resources at any time and to engage in learning opportunities. The participants were engaged in a process through which the circulation of knowledge, ideas and experiences among peers allowed them to develop their reflective skills and their understanding of teaching. In all the conferences, joint practice has been achieved among students with different specialties. In the Science conferences, for example, subject knowledge has been negotiated among physicists, chemists, biologists and engineers. Similarly, in the Primary conferences student teachers of different subject domains formed a community of Primary student teachers. The participants in each subject conference shared the same goals and the same specialized language.

### *Learning curriculum*

The learning curriculum of the conferences was not something designed or imposed by a central authority. The egalitarian nature of computer conferencing allowed students the autonomy to initiate discussion on areas of shared interests. The English students, for example, examined the relationship between English as a subject and racism, whereas the science students negotiated meanings of concepts within the range of science subject knowledge (see Table 4). The primary students reflected on issues about teaching students of differentiated abilities and needs and they extensively discussed methodologies (see Table 4). The needs of the students as developing teachers and members of the particular course shaped the processes and the content of the discussions.

*Transparency of the technology*

As the conferences evolved, the use of computer conferencing became more transparent as the participants gradually became capable of sending messages and downloading attachments. Therefore the conference participants were able to concentrate on the actual discourse rather than being worried about the use of the technology. Similarly, the transparency of the technology enabled them to find useful and relevant information from the conferences and to conduct online discussions. Finally, the use of the technology became internalized by the conference participants. This allowed them to think collectively about subject knowledge and relate this knowledge with their teaching practice.

*Membership*

Participation within the conferences allowed students a global view of the range of activities in which their peers were engaged. It included an understanding of the vital tasks related to teaching placements as well as less complex tasks such as the details of the course requirements. The exchange of views among peers, along with the contribution of knowledgeable experts such as the conference moderators, provided student teachers with an increasing understanding of what they needed to learn in order to become fully competent teachers. Participation in the conferences however, has been variable across student teachers. Some of them were active and vocal and contributed to the discussions, whereas others were silent readers and provided an audience for the discussions. All participants, however, had full access to the on-going activity and they shared the same resources: the threads of messages stored within the conferences.

*Identities*

The conferences were about discussing meaningful issues, thinking together and developing an identity. Identity has been an experience within the social context of the conferences in the sense that it helped participants to identify their needs and to recognize their own practice within the analyses shared in the conferences.

*Increasing participation*

The process of becoming full practitioners involved an increasing participation in the life of a conference. The proof for the conference participants' progression was the ideas they expressed within the messages they sent to the conferences. The messages that students sent to the conferences are the representations of their imagining about the pedagogy of teaching science, English or any lesson of the primary curriculum. Imagination was an important component of students' experience of their lives as developing teachers.

By extrapolating from the experiences shared within the conferences, they could imagine what their future lives as teachers would be. In that sense, imagination can be seen as a new form of reflection that stimulated the creative processes of producing new images of teachers and pedagogues through CMC. The participants of the conferences could translate this understanding into action during their conversations within peers and while developing their cycles of observation and practice in a clearly situated process.

Such a view implies that some characteristics of a community of practice (Lave & Wenger, 1991), can possibly be replicated within conferences organized for student teachers within the context of networked professional development. We argue that groups of student teachers engaged over a substantial period of time in reflective practice and learner autonomy through networked technologies are likely to form online communities signified by the negotiation of professional knowledge and understanding. The characteristics of the conferences discussed above, however, provide suggestive evidence worthy of further research as to the formulation of communities of practice in teacher education.

### **Moderating effective conferences**

Evidence from the case study suggests that the moderators' role was in enhancing learning by facilitating access to computer conferencing and engagement with the learning resources inherent in the conferences rather than instruction. Within the five conferences observed in the study, the moderators formed the online communities of student teachers in the sense that they organized the conference participants into groups of learners sharing common aims and values and undergoing similar procedures in the process of becoming competent teachers. The structuring of the learning resources within the conferences came from a variety of sources: the course materials, a range of professionals that participated in the conferences, the placement schools scattered around the country and mainly the experiences of the participants themselves. The life experiences, educational background and skills acquired in the past were integrated.

The processes that the moderators employed, in structuring the learning resources contained in the conferences within the case study, had two aspects. These concern (a) the building of a sense of a community and (b) the promotion of students' involvement in reflective discussion through CMC. Within the case study we identified the following strategies being used, especially at the beginning of the activity, in order to build a sense of a community among the participants: (a) clarifying the aims of the conference, (b) estab-



lishing 'netiquette', (c) setting the tone and (d) gaining knowledge about the students.

There is evidence of a link between establishing explicit aims within conferences and forming networked communities of student teachers. Communicating these aims to the students through sending messages to the conferences has been proved useful for keeping the discussion focused. Relevant to the above is the establishment of 'netiquette': the establishment of social norms and codes of contact online. The importance of netiquette for peaceful co-existence and interpersonal allegiance is reinforced by the absence of visual cues and non-verbal exchanges within the online environments. In the same spirit, setting the tone is particularly important in terms of maximizing the students' access to the learning possibilities of the environment. A friendly learning environment that encourages and values contributions provides access to the wide range of on-going activities and facilitates moving from peripheral participation to more central forms of participation. Being familiar with all the people involved in the community and knowing about their professional interests and experiences is a key strategy for moderation:

So, the first skill then [for a moderator] is knowing your students, finding out a bit about them and making sure that you know what they have to contribute to that particular environment and then making that known to everybody else. So, that's one of the first activities in the English conference that I set up, and is asking them to introduce themselves and to say why they are interested in the conference and what particular strengths they've got in English and I don't know if you remember we have a little section in the conference which is Introductions to each other. So, getting to know the students first, getting to know what interests they have and so that you can, if possible draw on that, but most especially so that the whole group knows what the knowledge is and interests and skills that the whole of the group is bringing. (Imogen Roberts, conference moderator.)

In order to promote students' involvement in reflective discussion, the moderators used the following strategies: (a) keeping the conferences focused as they progressed, (b) initiating discussions on new topics, (c) creating new areas within the online environment and (d) inviting guest speakers. As the conferences progressed, the moderators asked questions in an attempt to provoke discussions and created new 'rooms' in order to stimulate new discussions that addressed the different needs of the students. Guest speakers provided an article to the conference and students were prompted to read it and to discuss the ideas presented. The following message was sent by the Primary conference moderator in order to inform the students about the creation of a new conference area within the main Primary conference:

*Welcome to the Literacy Hour Conference.*

*The purpose of this conference is to support your work in planning and delivering Literacy Hour lessons. It will be an opportunity to share your experiences and to ask and answer questions about the theory and practice of the National Literacy Strategy.*

*There will be suggested themes for discussion at different points of the course, but this should not deter you from raising any other aspect of literacy teaching that you want to.*

*I'd like to begin the conference with a word level theme and ask for suggestions of texts which you think would be useful for teaching particular word level objectives, as outlined in the NLS framework.*

*If you have questions about the literacy hour arising from the recent (or in a few cases, forthcoming) Subject Specific Seminar it would be a good idea to send them now.*

*Try to participate actively as often as you can.*

Extract 7: Transmission of information by moderator

The moderators generally facilitated learning within the conferences through offering forms of participation to the students and encouraging them to construct an identity through participation. Ideally, the moderators were not the central figure or the dominant participant within the computer conferencing community. They had a 'light touch' role, but one which was important in terms of listening to the students and creating a space for them to contribute to the discussions. In order to achieve that, the moderators stood back and withheld advice appropriate to later phases of the conference. This would often mean that they tried to diminish their authority in order to allow students to participate and to develop through their involvement with the processes of the conference.

## **Conclusions and future research**

This chapter has identified some key factors that influence the form of networked learning in teacher education. (a) The way in which computer conferencing is organized within the context of a formal course influences the form of professional discourse within the conferences, (b) the contrasting character of subject domains can be related to differences in the form and the style of discourse within the conferences and (c) the length of engagement of the participants in computer conferencing influences their transition from novices to more experienced participants in networked learning processes. Evidence suggested that networked computer technologies offer pedagogic

advantages for groups of developing teachers, in particular through promoting reflection and learner autonomy. Educational imagination is seen as a new form of reflection which encourages exploring, creating connections and constructing meanings and it is especially significant because it enables learners to see the multiple ways in which they can interpret practice. What also emerged was recognition that the moderator's role is crucial in sustaining effective conferences through the structuring of the learning resources inherent in the conferences. In relation to the above, the potential of the participants in networked learning to constitute learning resources through making broadly available previously and newly acquired knowledge to peer learners has been recognized.

Although this study explored the conference participants' transition from novices to more experienced participants in networked learning processes, there is a need to examine in greater detail the length of engagement of participants in networked environments and to understand the dimensions of this transition. Similarly, the notion of educational imagination needs to be revisited in order to refine how it may help student teachers to construct an identity. Most importantly, the identification of some of the characteristics of the conferences observed which are conducive to the emergence and production of online communities remains as suggestive evidence worthy of further research. Further analysis needs to revisit the concept of community of practice as an arena to discuss professional development and to research the ways in which such communities can emerge within networked learning contexts.

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## Chapter 7

### Opening dimensions of variation: An empirical study of learning in a Web-based discussion

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**Abstract.** The discussions held in specifying an automatic vehicle as a project in a distance work-related course are in focus for an analysis of learning in networked discussions. Learning is characterized as coming to experience things in distinctly new ways, in keeping with the underlying phenomenographic research approach for the study. Group discussions are seen as one feature in the experience of, and the formation of, the context for learning, in an experiential interpretation of activity systems. The analysis has led to the identification of pivotal contributions to discussions that can be said to afford learning within the group, in the sense of opening dimensions of variation around critical features of the task. This is developed to produce a taxonomy of contributions, with participatory, factual, reflective and learning contributions, suggested to be necessary, though not sufficient, conditions for learning. The taxonomy is illustrated and discussed, as are its implications for tutoring in networked courses of this type.

**Keywords:** activity systems, collaborative learning, computer mediated communication, distance education, networked learning, online tutoring, phenomenography

### Introduction

Doug. Title: RE:Sensors Content: Hi there,  
I think we should specify our system to work in city traffic as well as highway traffic. The only difference, really, from city traffic and out-of-city traffic, is that there are more cars more curves and more traffic lights in the city.  
/Doug

That quote comes from a member of a group of engineers who are working with the task of producing a specification for an automatically steered vehicle, as part of a networked course in vehicle electronics and system design. Not remarkable in itself, maybe, but we wish to develop the thesis that it exemplifies a pivotal contribution to their discussion indicating a potential for learning.

The article reports a part of a wider study, aimed to develop a theoretical understanding of learning in such courses, where the subject matter is di-

rectly related to the participants' practical experience. A phenomenographic perspective on learning underpins the study. On the one hand, learning is seen as coming to understand something – the nature of the electron, perhaps, or one's own practice – in a qualitatively different way (Marton, 1981; Marton, Hounsell & Entwistle, 1997; Marton & Booth, 1997); on the other hand, the empirical research approach aims to analyze and describe the variation in which aspects of learning are experienced by the learner and draw pedagogical conclusions.

A challenge in designing distance education is to take account of the heterogeneity of the participating students – both of educational background and work experience, and culture and language. Each student has a unique context for his or her studies, in terms of relevant academic experience as well as physical and social environments. A major feature of our wider study has been to analyze this context, as experienced by the learners, characterizing it as an activity system (Engeström, 1993). We interpret an activity system to imply a dynamic situation in which the learner directs attention to an objective, which is achieved through interaction with intellectual and cultural artifacts in a sociocultural field of community with its cultural rules and experienced roles (Hultén & Booth, 2002). In keeping with the phenomenographic framework, however, we have been seeking qualitative differences in ways in which the context of studies is, on the one hand, experienced, and on the other hand, formed.

This paper is concerned with the characteristics of contributions to Web-based discussion, and the implications for learning, which a reading of the literature shows to be a well-researched, if not well-understood, issue. Specific case studies predominate, such as that of Veerman et al. (2000) who studied pairs of education students (in the presence of peer coaches) for the argumentation and constructive activities they engaged in during synchronous chat discussions while they were analyzing given statements for their significance in a particular conceptual framework. A meta-study of several case studies involving online fora (Hammond, 2000) reports that it is not only the contributors who believe they benefit from such discussions, whether synchronous or asynchronous, but even those who remain silent were positive to them; those who did participate in a working forum experienced a sense of community. However, he also reports that those who claimed that the online forum supported their learning, “found it hard to say what they had learnt apart from their obviously increased familiarity with the technology” (p. 255). Burge (1994) categorizes four kinds of peer behavior as required for learning: participation, response, affective feedback and focused messaging. But the nature of learning involved is not described, it is *studying* that is focused on.

As in the Burge study, the nature of learning is often not specified in theoretical terms. In studies where learning *is* brought into focus, it is activity theory that is generally referred to. Here learning is characterized as occurring in interaction with others and with tools, grounded in both the sociocultural following of Vygotsky and the constructivist following of Piaget. Wännman-Toresson adopts such a perspective in an extensive study of women learning in courses and in networks (Wännman-Toresson, 2002). We will return to some of these studies after presenting our results.

We will now describe the research we are engaged in: the course that provides the background, the nature of learning in a phenomenographic perspective, and the discussions that we have analyzed.

### **The background for the discussion: course and project**

Vehicle design and manufacture is an area of rapid change, above all because of the advances in mobile communication and sensor technology, and demands being made for safety, economy and a cleaner environment. When a multi-company, multi-national vehicle concern is introducing electronics more and more into the design of all aspects of their products, the engineering staff at all levels need to become more knowledgeable about, more insightful into, and better able to discuss issues in the field. A reasonable move is to commission a programme of education that can be made available to employees, accessible on the Internet, and related to practice. Such is part of the background to this paper.

The company involved commissioned a multi-media Web-based course, designed in a collaboration between a branch of the company (to handle finance and contact), a university engineering department (responsible for content), and a media company (to handle production and maintenance). The case we have studied involves students of the first of the course's three levels in the spring of 2001 who chose to take the option of a collaborative study-path including two group projects.

The course is related to practice in two senses. As shown by the course goals, its content is directly related to the work of the engineers at the company, and the changes that are currently taking place. Further, the written seminars, or projects, resemble the distributed ways of working that are becoming more common in globalized concerns where expertise is distributed over countries and time-zones.

The first level of the course comprised stand-alone modules with the possibility of tutorial help and two optional collaborative projects – the first in brain-storming seminar form and the second aimed at specifying an automatic driving system (Figure 1). The requirements are simple: the vehicle must be

Title: Project assignment

Content: We would like to wish you very welcome to the project of this course, which is subdivided into three sessions, where each session should have an outcome.

Since the problem formulation is fairly vague, a discussion about different aspects, is also a part of your assignment.

We will also remind you about the difference in communicating in such a forum.

Make sure to be completely clear and ask if you do not understand what someone else has written.

*The task is to develop an entirely automatic driving system for a car.*

Requirements:

- 1) The system should be able to drive the car from a given point A to another given point B on a road map.
- 2) The car must obey traffic rules and run gently and safely.
- 3) The system must be easy to handle by someone who has a regular driving license.

Session A (March 19–April 1)

Discussions about equipment required, and what considerations to take into account.

Session B (April 2–May 6)

In this session the design of the user interface should be developed.

Session C (May 7–May 20)

First you conclude and sum up the project. After that a presentation of the system is to be posted.

Figure 1. The problem posed for collaborative solution toward the end of the first level of the course (our italics for clarity).

able to navigate for itself from A to B, it must conform to normal safety standards, and it must be handleable by a normal driver. There were three deadlines set over a period of two months, dividing the period into three sessions, most time being allocated to the central issue of producing a user interface for the automatic driving system. It is the transcripts of discussions from this problem-solving task that underpin the analysis in this paper.

Five groups (A–E) embarked on the project, initially with between 1 and 5 participants because of drop-out. The tutors were available in principle, but it so happened that the company was installing a completely new computer system, which excluded these university-based tutors for much of the time. Further, the tutor in charge felt that intervention was undesirable and basically left the groups to their own devices apart from welcoming them and making short remarks on deadlines.



## Phenomenography and learning

The study has been influenced and informed by the phenomenographic tradition (Marton, 1981; Marton, Hounsell & Entwistle, 1997; Marton & Booth, 1997). We have elsewhere described the context for learning as an activity system, and there attempt to describe it as experienced by the actors in the system (Hultén & Booth, 2002), taking a second-order perspective on the object of study – striving to see it as others see it. To this end we have carried out empirical phenomenographic studies, through interviews with participants in the distance course. In this paper, however, the only data we have are the archived group discussions that took place in the second project.

Out of more than 30 years of empirical studies in the emergent phenomenographic tradition there has grown a theoretical framework for approaching learning, which will be described briefly here. First, knowledge is seen as a relation between the knower and the known, and learning is seen as a *qualitative change* in that relation, meaning:

... the learner has developed a capability to experience a certain phenomenon when it appears in a novel situation in a particular way (which goes beyond the other ways in which she has been capable of experiencing the phenomenon), which in turn means that the relationship between the learner and the phenomenon has changed. The learner has become capable of discerning aspects of the phenomenon other than those she had been capable of discerning before, and she has become capable of being simultaneously and focally aware of other aspects or more aspects of the phenomenon than was previously the case (Marton & Booth, 1997, p. 142).

This is in contrast to learning in the sense of acquiring more and more of the same sort of information (such as French vocabulary), or learning to use a new word-processing program. It is learning in a more fundamental sense, and implies understanding, sense-making, and seeing things in new ways.

The empirically grounded perspective on learning has moved into a phase of theory development, aimed at identifying the aspects of the learning situation, and thus the teaching approaches, that afford such learning (e.g., Bowden & Marton, 1998). The three essential terms here are *variation*, *discernment* and *simultaneity*. ‘Variation’ is an essential aspect of learning in this sense: that learning occurs (things are seen in distinctly new ways) when a dimension of variation opens around a phenomenon or aspect of a phenomenon that once was taken-for-granted. ‘Discernment’ is the act of seeing this no-longer-taken-for-granted phenomenon or aspect of a phenomenon in a new light. ‘Simultaneity’ – seeing *both* the once-taken-for-granted and the no-

longer-taken-for-granted – is demanded for the dimension of variation to open. Lack of understanding is thus linked with being unaware of the potential for variation – seeing only that which is taken-for-granted. Instruction can be designed to reinforce such taken-for-grantedness or, preferably, to challenge it, to open the dimension to deliberate reflection. The task of the researcher is to delve into the ways the learners experience critical aspects of the learning situation and describe the variation in order to problematize the taken-for-grantedness. And the task of the teacher is to provide students with situations where some particularly critical feature of the material they are learning can be brought out of a taken-for-granted background by meeting variation around that feature.

While traditionally it is a teacher who devises and manages such situations, in a distance collaboration it is the group – with its greater autonomy, engaging in discussion around a scenario that a teacher has challenged them with – who manage themselves. If they are to learn anything about vehicle electronics and system design from solving this problem about automatic driving vehicles, they will now be managing their own learning situations since the tutors are only peripherally involved.

As described here, learning of this sort is essentially an individual business. It is the individual and the individual alone that develops the capability to experience something in a new way. When speaking of the phenomenon in focus, the individual directs his or her awareness toward the phenomenon, or toward some aspect of it, or toward the situation in which the phenomenon is perceived, or toward his or her own relation with the phenomenon in a reflective mode; the locus of learning is identical with the individual learner. In group discussions, however, the locus of learning is less clear. In the transcripts of discussions, utterances are directed to one another, or to the collective solution that is under way, rather than to oneself, and the locus of learning is distributed over the group situation – insights are jointly constituted (Booth et al., 1999).

What we are suggesting in the analysis that follows is that dimensions of variation can be opened in discussion, affording learning. This is not to say that learning takes place, neither in an individual nor in the group; but it can be said that a potential for learning is provided when a dimension of variation is opened – the conditions for learning are present to the group and to the problem-solving process. We go on to analyze the discussion in more detailed terms, classifying the contributions according to their roles in the understanding of the problem and the emerging solution, and drawing conclusions about the preconditions for learning contributions to occur.

## Two group discussions

Two of the group discussions have been analyzed, they being the most substantial of the five from level 1. Group A comprised 18 contributions from 3 participants and the tutor; Group D comprised 32 contributions from 6 participants (three of whom came over from less active groups) and the tutor. Here the participants from Groups A and D have been given fictitious names starting, respectively, with A and D, while the Tutor has been called Tim. The remaining three discussions comprised only the tutor and one participant; one group died out altogether and the participants from the other two moved over to Group D.

As shown in Figure 1, the nine weeks allocated to the project were divided into three sessions, each with a deadline; Figure 2 shows the frequency of contributions from Groups A and D over that period. Group A (light gray) waited several weeks before getting going, coming in toward the end of the second phase, while Group D (dark gray) started at once and communicated fairly regularly throughout the period. The only Group A contribution of substance in the first phase came from Adam, with a header "The easy way again"; he directed everyone to a futuristic Web-site where features of automatic driving were taken up, where the solution might be found. The tutor responded "If you use the information here, maybe combined with some additional thoughts, you will have a nice start for this project. However the important thing is to discuss the different features" and the discussion dried up for three weeks. In the sixth week Arnold and Albert, new members or late starters, turn up, and a dialog ensues in which they, with a reappearance from Adam, rapidly put together a requirement specification, the task for the second phase. They go on immediately to write a user specification, and prompted by the Tutor they post their solution on time.

Group D started their discussion at once, with four members corresponding in the first phase. In the third week, the first of the third phase, Group D exchanged 9 substantial contributions, with a new member, Dorothy, also 'checking in' and Tim the Tutor making a short encouraging remark. Here they are hammering out what such an automatic driving vehicle should be able to cope with, and this is important for the analysis below. Dorothy has come from another group which folded at once, and she contributes what that group had discussed. Denis returns from holiday in the fourth week and promises to get into the project but never reappears. There is more social contribution than in Group A, which went directly from a long silence to an attack on the problem. When new members ask to enter Group D, for example, Dick asks them to present themselves to the group, and they get responses in return.

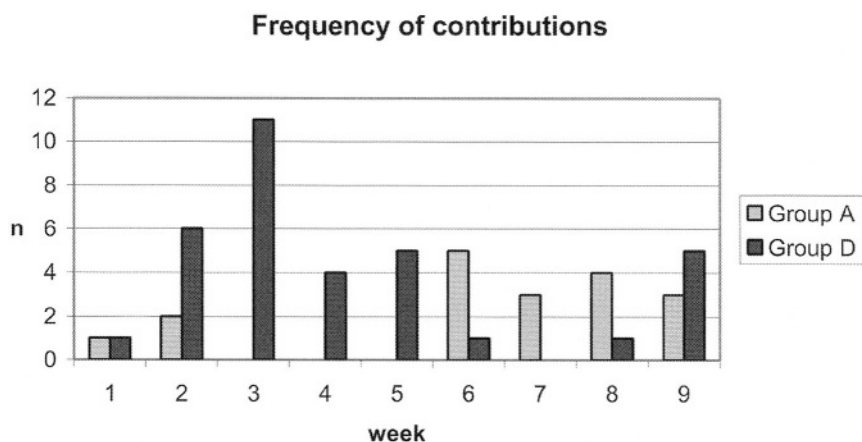


Figure 2. Groups A and D, frequency per week, weeks 1–9.

This superficial quantitative analysis is similar to the first of the three analysis phases employed by Howell-Richardson and Mellar (1996), with their much larger sets of contributions. Their other two phases, which underpin the substance of that article, were analysis and visualization of inter-referential links between messages and an interaction analysis, based on a variant of speech act theory. We too continued with a study of what we called pointing reference, a term from the phenomenological work of Gurwitsch (1964) on the field and the stream of consciousness, and which here can be either forward (asking or naming someone) or backward (agreeing or disagreeing, supporting, extending or denying something that was written earlier). Such reference can be oriented toward the social, or the concrete problem, or the emerging solution. But our interest was not in the patterns of interaction, but rather on what we could see that pointed to a potential for learning.

### Where is the learning?

In the introduction to this paper there is a quote, taken from Group D, the 14th contribution in sequence, which we see to be an example of a single statement where variation around critical aspects of the phenomenon – city traffic and highway traffic – are brought into simultaneous awareness at the group level, and thus can be seen as affording learning at the group level. How did this arise?

Earlier in the discussion, after welcoming one another and some new members, Daniel joins the group, having left another moribund group:<sup>1</sup>

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*Daniel. Title: Auto pilot* Content: Hi all,

I don't know if this will satisfy the course requirements, but I have thought of two situations where we would be able to benefit from 'autopilot' in a truck. The vehicles will not be running in inner city traffic, obeying traffic rules, such as traffic lights, give way signs, pedestrians' etc. PLEASE COMMENT

#### Scenario 1

A truck is carrying iron ore from a mining site to the processing plant 100 km away. A driver drives the truck once and the truck then memorizes the trip and will be able to run on autopilot again and again. Later when the dugout move slightly, a driver run the first trip again.

- \* We must be able to stop if there are obstacles in front of the truck
- \* The process should be monitored
- \* We should be able to adjust the speed according to driving conditions
- \* The truck should be driven in the most cost effective way possible

#### Scenario 2

A truck is driven from Perth in Australia to the eastern seaboard. Here you will cross the Nullarbor Plain, approximately 2000 km of dead straight road with hardly any traffic. The driver should be able to start his autopilot and go to sleep in the back of the cab.

- \* We would need to deal with oncoming traffic
- \* We may have to overtake slow or stopped vehicles
- \* Other than that we would just have to stay on the road surface
- \* Or ???

This, apart from the first contribution which threw some ideas into the ring, is the first substantial contribution to the problem, and offers two scenarios for the automatic vehicle to drive on highways in wide-open, desert spaces. The encouragement to "PLEASE COMMENT" achieves its goal and Doug replies the same day, criticizing both of Daniel's scenarios, the first because of potential hazards in changes to routes, even in remote areas, and the second because of its limited applicability.

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*Doug. Title: RE:Auto pilot* Content: Hi Daniel,

About the autopilot. I don't think that the implementation where the driver learns his truck the way from point A to point B is very good. What happens if there are some kind of road work or similar and the traffic gets redirected? I think the best way to solve the problem is to let the truck/car know where it is and calculate the best way to the target with help of maps and traffic information.

About the second scenario ... do you mean that when you transfer to autopilot on the straight road the truck only goes straight forward? In this example the truck does not know from where it came and not its destination either. This kind of autopilot would only be useful in a very limited number of applications.

So to summarize my discussion: For the 'autopilot' to be useful I think it need to know the vehicle's current location and it's destination. It also needs access to applicable maps and traffic information.

best regards

/Doug

Daniel replies the next day, elaborating on his suggestions, promoting the idea of looking into inner city traffic, and promising to think about it and get back

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*Daniel. Title: RE:Auto pilot Content:* Hi Donald,

The thought behind the truck memorizing the trip was that sensors are expensive and software is cheap, so if the ABS sensors could measure distance we could guide the truck from A to B, turning when necessary by applying the brakes slightly to just one front wheel at the time. Another advantage was that it would be easy to change the route. We would need other guiding as well.

As for the truck running from Perth to, say Adelaide. The driver could go to sleep while the truck found its own way in this very remote area, and as such he would be able to make this run a lot faster than if he could only drive 8 hours per day. Naturally we would have to guide the truck through road curves and past other traffic. Again I understand that we would need some form of guiding system to do this in a safe manor.

But I think that we have decided to go with the scenario of a vehicle running in inner city traffic, and see how far we can get with this. I will think about it for a day or two and get back to the project as soon as possible.

BR//Daniel

Dick, who tends to take the role of moderator (while denying the need for a project leader) says, bringing attention back to his interpretation of the demands of the task:

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*Dick. Title: RE:Sensors Content:* Hi Daniel,

I get the impression from the requirements that the car should be able to

run in inner city traffic. Should we try with that to begin with and lower the ambition if it turns out to be too difficult?

And then comes the pivotal statement from Doug:

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*Doug. Title: RE:Sensors* Content: Hi there,

I think we should specify our system to work in city traffic as well as highway traffic. The only difference, really, from city traffic and out-of-city traffic, is that there are more cars more curves and more traffic lights in the city.

/Doug

What happens there, and why do we select it as important? In the first sentence Doug brings together two threads that have been running through the debate: whether to start from the requirements of city traffic or highway (desert) traffic in making the specification. And in the second he brings them into simultaneous juxtaposition. Thus this single statement opens a *dimension of variation*, the space for learning about the range of functions the vehicle must have. This might not be remarkable if it were not followed the same day by Daniel writing a specification for ‘requirements’. Here he has extended his simplified desert scenarios to embody the more complex city scenario around its three critical features: variable traffic conditions, need for maneuver around hazards, and imposed stops.

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*Daniel. Title: Requirements* Content: Hi all,

Can I suggest that we start listing things to be consider when running a vehicle through inner city traffic, and then later we can start looking at what is required to do so?

1. we must be able to start, stop and to find right speed
2. we must be able to sense traffic in front of us, and not confuse these with oncoming traffic or parked vehicles
3. we must identify the location where we are and where we want to end up
4. we should stop for pedestrians (kids playing in the streets?)
5. we should recognize traffic conditions such as rain, snow and fog
6. we would have to use indicators when turning
7. we should all the time stay in our own lane, but must be able to change lane if someone has perked his car up in front of us
8. we should be able to overtake a very slow vehicle

9. we should be able to deal with roundabouts, intersections with more than 4 roads, merging lanes, road works (re-routing traffic), speed bumps, traffic lights and much more.

BR//Daniel

As described above, the phenomenographic view of learning is that variation is a necessary condition for coming to discern new aspects of a phenomenon. But variation as such is not sufficient; the variation must be in a dimension that covers some critical aspect of the phenomenon. Here, the critical aspect was in answer to the question, 'what functions must an automatically controlled vehicle have to cope with qualitatively different sorts of conditions?'. The dimension was opened by Daniel suggesting a simplification of the specification (based on his experience of many years in Australia) followed by other group members disagreeing, reaching a synthesis in Doug's observation where qualitative distinctions are simply stated. Neither city traffic, nor highway traffic can now be taken for granted: they are both in the arena and the specification must take account of both.

There are other dimensions of variation opened in Group D's discussion. A second dimension opened to variation, also in week 3, is that of finding out where one is – *positioning* via GPS or *locating* through sensors – which runs in parallel with the desert-traffic/city-traffic discussion, and can be spotted in some of the contributions already cited. The contribution from Daniel that narrowed down the problem to desert traffic that only needs to know where it is and where it is bound for, implied *positioning* through GPS. Dick, disagreeing with the principle of considering only desert traffic, elaborated on the specification by adding that the auto-pilot would need a map and information about traffic – still *positioning* in focus. Daniel then justifies the economics of auto-piloting and brings sensors into the discussion as relatively expensive hardware; but now there is an implication that some sensors would also be needed – *locating* has come into view and *positioning* is no longer taken for granted as the means of finding out where one is. Then Donald, changing the thread title from 'auto-pilot' to 'sensors', starts to differentiate between what sensors are needed for (fine detail navigation, around obstacles etc.) and what GPS can accomplish (positioning on a large scale).

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Donald. Title: Sensors Content: Hi all,

I'm just sitting here and reading about our equipment and I can see that we must have several of different sensors. If the car should drive self we must have sensors which feels of different thing like other car, people on the road. I think the car must feel off all this from at least 10 m. My point is that the GPS navigator feels of all cars etc from a bigger area and



send signals to the engine and slowdown the speed and then the sensors is feeling when you come clooser to other things, the other car is sending a signal to my car that we are pretty close too each other and my car send a new signal to the engine to slow down moore or stoop and wait. ...

//Donald

This is another refinement of the specification, brought about through the simultaneous juxtaposition of two kinds of device, sensors and Global Positioning System, as principles for automatic steering, offering potential for learning by problematizing the qualities and demands of knowing where one is.

As a third example, the group assumes a designer perspective on the car until, in week 5, Donald opens a contribution with:

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*Donald. Title: How we should drive the car* Content: Hi all, we haven't talked about we should drive the car, but I have a few ideas. When we entered the car we have a plastic smart card where all your data is, Who you are etc. Then in the car we have like a harddisc where we put this card. Now we can start the engine, after that we must consider were we want to go. ...

And he continues with a description of what it would be like to drive such a car. The dimension 'designer-driver' is thus opened and reveals important functions that have not been considered hitherto. Again, the change of perspective has brought critical aspects of the steering system simultaneously into focus and a more refined specification starts to take form.

Referring back to our description of learning from a phenomenographic perspective, we can thus say that there are certain sorts of statements in the context of certain forms of discussion, that offer potential for learning within the group – whether that learning is of an individual who grasps some aspect of the problem and its solution in a new way, or of the group illuminating the problem/solution process in some new way. The issue of 'where is the learning?' highlights the community of the group, for it is clearly there that learning can be located in a joint constitution of insights. Such a contribution is distinctly different from other sorts of contribution where additional facts are offered or sought or disputed.

The relation between group processes and individual processes with respect to learning is an important factor to consider. The issue is brought up by De Laat and Lally (2003) who point out that the "thinking of individuals is influenced by the group in which they are working" and that "the tension between the conceptual structure or understanding (of the problem or ideas under discussion) of the group and the individuals within in it ... is the driving

force for the collective processing of the group". In the data presented here, it is equally hard, possibly impossible, to separate the individuals from the group they constitute, and we prefer to speak of the group being present to a potential for learning, or the joint constitution of insights, in the discussion sequences described above. Then, what constitutes a group that creates its own potential for learning in this way, in contrast to the cumulative process like those of Group A, is a question that has to be addressed in another study, possibly within another theoretical framework, such as activity theory.

In order to make pedagogical use of our new insight into learning in the discussion, the next stage is to look at the various contributions, asking what characterizes this so-called *learning contribution*. We can look afresh at Groups A and D, and return to the analysis stage where the structure of the discussion was examined.

### **A taxonomy of contributions**

When the contributions that we have identified as 'learning contributions' had been identified, and their infrequency remarked upon, we set out to characterize the discussions that led up to them. On a very reduced transcript (facilitated by printing 16 pages onto 1 A4 page), we drew arrows to indicate the paths of participants' questions and responses (referred to earlier in the paper as pointing references) which gave the insight that the learning contributions came when some sort of uncertainty (a mild dispute or parallel threads) had been running. This pointed to two sorts of contributions other than learning ones – those which filled a participatory function and those that were purely factual in nature. The participatory contributions carried the thread along and could even be seen as a social contribution; they lend structure to the discussion other than the time-constrained additive structure. The factual contributions bring the learner's factual knowledge, or their seeking it, into the discussion.

As a result of returning to the whole discussion transcripts once again, and analyzing what the contributions and parts of contributions are directing attention toward, four categories of contributions have been identified. They have distinctly different referents within the problem-solving space, and are associated with different sorts of verbs. They have been called participatory, factual, reflective and learning contributions, forming a taxonomy, or possibly a hierarchy leading toward learning.

### *Participatory contributions*

A participatory contribution is one that refers explicitly or implicitly to another member of the discussion group. It acts to confirm one's presence and to acknowledge the presence of others. The referent of the act can be purely social (which rarely occurred here), or it can concern the project as such, or the emergent specification, without contributing to understanding or solving the problem. It is characterized by verb-types such as *identifying* (oneself), *naming* (a person), *referring* (to a person or what a person has said), *acknowledging* (an earlier statement, by name), *asking* in a general sense, or *requesting* in a general sense. For example:

My name is Doug and I'm working at Volvo Aero. I am an electrical engineer and I'm working with development of control systems for jet engines. (D5)<sup>2</sup>

Nice to get some response. Good points from you. (A7)

Hi Donald. I wonder if it is necessary with a project leader? If we try to work together I think that is enough. (D7)

I will think about it for a day or two and get back to the project as soon as possible. (D10)

These participatory contributions lend the discussion cohesion, through presenting oneself, exchanging personal information, addressing one another by name, and acknowledging the presence of others. In Group D there is more feeling of a group in this sense than in Group A: they exchange names and refer to the group and its progress, ask for comments and improvements to the existing work, and encourage and congratulate one another.

### *Factual contribution*

A factual contribution is one that refers specifically and exclusively to the problem in hand, whether as a given project or as an emergent solution. It is characterized by verb-types such as *stating* (an opinion or a fact), *proposing*, *elaborating*, *extending* and *explaining* (part of the specification), or *asking* a content-related question. A factual contribution offers new information or adds information or makes suggestions about missing information. For example:

We need backup of important controllers. That is usually called redundancy. (A7)

There were many good points here but I would like to make a few additions. (A 10)

For the network I also think that CAN is the best solution since it is widely used in the car industry. I have worked a lot with 1553 which is a serial communication bus similar to CAN but it is a Military standard. (D29)

A factual contribution can point to the project, to practical experience, or to the emergent specification. It is extremely rare to find a statement that points to content of the course of which the project is part; practice and experience are more likely sources of input. When Daniel (D10) justifies his suggestion for memorizing the route with “sensors are expensive and software is cheap” he was quoting from the first project description; and above, A7 stating “That is usually called redundancy”, might be taken directly from a module of the course. But further cases are not apparent.

The discussion of Group A is largely an exchange of factual contributions, whereas in Group D factual contributions are alternated with and integrated with other forms of contribution.

### *Reflective contribution*

A contribution that indicates reflection is characterized by verb-types such as *questioning* something that has been said or assumed, *agreeing* and *disagreeing* (with some form of justification), *comparing* two or more points of view, *isolating* a detail (from a more general field in order to bring out some aspect of the field), or *problematizing* (ceasing to take something for granted). The referent is inevitably some feature of the problem and its transformation to a specification, not factually as in the previous category, but rather considering the situation and seeing it in a new light.

Why do there have to be pedals and a steering wheel, they're just what you can injure yourself on if there is a collision. Wouldn't a little joystick and something instead of the foot-pedals be better? (A11)

About the autopilot. I don't think that the implementation where the driver learns his truck the way from point A to point B is very good. What happens if there are some kind of road work or similar and the traffic gets redirected? I think the best way to solve the problem is to let the truck/car know where it is and calculate the best way to the target with help of maps and traffic information. (D9)

My question is if it is ok for us to rebuild the city or if the car sh[a]ll drive by it's self in the daily traffic like it seems to be today, if it is ok we can continue now with our sensors and transmitters. (D19)

It is contributions such as these that indicate active participation in the project development, and interactivity within the group.

### *Learning contribution*

These contributions, as was implied in the previous section on the location of learning, are characterized by *discerning*, *refining*, and consequent *opening dimensions of variation*, but there are no clear verbs associated with such contributions. They are difficult to isolate because they are recognized by what precedes them and what follows them as much as by what they say in themselves: they are only recognizable as pivotal in a whole thread of discussion. They appear as the culmination of two or more threads of parallel or even conflicting lines of argument, and continue with a clearer goal to the argument or with a concrete outcome such as a refined specification. Exactly the same stream of words could be classified differently if they occurred in a different stream of discussion, without on the one hand the associated reflective and factual contributions, and on the other hand the outcome of a more complete design specification.

Three examples have been given in some detail in the previous section, and we will not attempt to repeat them here. A characteristic of such contributions is an element of critique, whether of one's own thinking or someone else's, followed by a search for a better way of expressing or analyzing a situation associated with the project.

### **Discussion: relating to activity and interactivity**

Taking the phenomenographic starting point, seeing the data with phenomenographic eyes, has led to our analysis, which is – in keeping with phenomenographic work in general – inductive in character. The first stage of analysis was to try and see the interaction that occurred within the group – who invited others to communicate, who responded, and what ensued? It then became apparent that certain statements were pivotal – and thus Doug's statement came into focus. Only then was it seen that this could be interpreted in terms of learning in a phenomenographic sense, and that was supported by the phenomenographically derived theoretical view of learning.

Re-examining the discussion led to the taxonomy presented above, which can now be described as a necessary (though certainly not sufficient) hierarchy for learning, in the phenomenographic meaning, to occur. For a *learning contribution* to be made it is necessary that questioning and justified agreement and disagreement of the *reflective contributions* have been present. Reflection can only occur when participants in the discussion are presenting, proposing, asking for, facts related to the problem in hand and the emergent solution, or *factual contributions*. These, then, are prerequisites for learning. The *participatory contributions* are what identifies the individuals as mem-

bers of a collaborative unit where such discussions are allowed, trusted and supported in a social sense, what makes each contribution worthy of examination and response. Our data is limited, but nevertheless its scope is adequate to bring these qualitatively distinct categories of contribution to light when related to the theoretical framework provided by the phenomenographic view of learning.

We can compare this with the more dominant theoretical stance of activity theory, where interactivity between participants, supported by computer-based tools, is central. Wännman-Toresson (2002), referred to earlier, developed an analysis approach based on three models to be found in the literature, more or less associated with sociocultural views of learning, characterized as occurring in interactivity with others through language and other mediating artifacts. The first model (Dysthe, 1999) looks at complexity and potential complexity in terms of interactivity and the potential for interactivity. The second (Henri, 1992) is based on the five dimensions distinguished as participatory, interactive, social, cognitive and metacognitive, though Wännman-Toresson's restricts them to content-related and social dimensions. The third (Häkkinen & Järvalä, 1999) is based on five stages of social development – egocentric, subjective, mutual perspective-taking (acceptance), common perspective-seeking (consensus) and societal symbolic perspective-taking (at a higher level). Summarizing, learning can be associated with interactive, content-related, and perspectival contributions. Subject matter and the way that the discussion relates to it takes a relatively minor role in such an analysis, it is rather the degree, the extent and the quality of interaction that is subject to analysis.

Relating this to our own data, it can be seen from Figure 2 that the interactivity is greater in Group D than in Group A, though Group A appears to get going shortly before the end of the task. Both groups focus much more on the content of the problem than on social communication, though there is some social communication in Group D and almost none in Group A. And the notion of reaching consensus of perspective is taken for granted in the production of a joint specification that dominates the sparse communication of Group A, while there is more of a productive argument in Group D in coining to a joint understanding of the problem and the specification.

One clear point for further investigation is the relation between activity and interactivity, or in other words the amount participants contribute to the discussion and the degree to which they listen to, think about, and act on what they find there. Wännman-Toresson's work indicated convincingly that activity is a prerequisite for interactivity: the greater the activity in a group the proportionally greater the interactivity she measured. This is positively corroborated in Group D's intensive activity of Week 3 (see Figure 2), where two

of the sequences that opened dimensions of variation occurred, and corroborated negatively by Group A where the degrees of activity and interactivity were low and no learning contributions can be seen.

### **Implications for online tutoring**

The sort of learning in focus in this paper is in certain respects different from the learning that is reported elsewhere. For example, Wilson and Whitelock (1998), describe how students were found to get help and give help in their group discussion fora, spurred on because they were dealing with novices like themselves. In the present study the actors were actually in some senses experts, though in different areas of vehicle electronics and system design, and had a wide variety of formal qualifications. The group discussions reported actually draw much more on experience than they do on the content of the course (and could well have acted as an introductory task rather than a final task). Other case studies are related to courses that aimed at familiarizing students with the forms of computer supported communication and what can happen in a computer-mediated discussion (e.g., Light et al., 2000). In comparison, the form of communication was relatively uninteresting for the students and the tutors in the present study, but the content was of great immediate interest, both theoretical and practical.

Looking for pivotal contributions has the advantage of maintaining the subject matter of the course in focus, which is more accessible to the designers and tutors than is pedagogical theory. It can be a useful tool for the tutor who is evaluating group discussions or evaluating their own contributions. Recognizing such a contribution can indicate that the group is handling the task productively, and attention can be paid to bringing those who are not contributing into the discussion. The absence of such contributions can indicate that the group is taking a surface approach, and that the conceptualizations also need to be worked with.

The argumentation that Veerman, Andriessen and Kanselaar (2000) were investigating, referred to earlier, led to content-related phases of the discussion being probed for constructive activities, in terms of bringing focus onto meaning of concepts, which was seen to indicate a collaborative learning process. The pedagogical conclusion of their study was that student pairs who could be characterized as Conceptualizers or Conceptual achievers – those who focused on grasping the meaning of concepts – did not need coaching in argumentation and reflection, while those who were characterized as Achievers – focusing on the use of concepts and completing their task – benefited from such support. This result can be related directly to our result: Group D's discussion has the tone of Conceptual achievement, aiming to get to the

bottom of the task in hand rather than merely complete it, while Group A took on an Achieving tone at the start, when Adam suggested finding the solution in a web-site on vehicles of the future. We might be looking at the group equivalent to deep approaches and surface approaches to learning tasks, established within the phenomenographic literature (Marton & Booth, 1996; Marton, Hounsell & Entwistle, 1997).

Such insights can also be interpreted to give general advice to tutors in courses such as ours: when it comes to comment on the content of the task, leave alone groups who are clearly working toward the conceptual content of the task, showing reflection and learning as well as factual and participatory contributions; focus instead on those who are clearly seeking to achieve a solution to the task with predominantly additive factual contributions and no reflection. This is in addition to the obvious general advice of trying to bring silent group members into meaningful participation. More specific advice is much more difficult. One lesson from the deep and surface approach work is that it is all too easy to technify the learning situation in an overall attempt to encourage deep approaches, and actually achieve the opposite effect (Säljö, 1975; Marton & Booth, 1997, p. 169). Better to attend to individual groups and encourage those who are seen to be working exclusively toward completing the task in hand to widen their horizons and consider alternative features of the task.

## **Conclusion**

The analysis of discussions carried out in a networked course when engineers are working on a project related to their working practice has been presented, and related to learning within a phenomenographic framework. The taxonomy of contributions has been put forward as a tool for analyzing the potential for learning in such a discussion, and implied lessons for tutors. The study has been limited to one course and only two group discussions within that course, and deserves to be extended to other similar networked discussions. The next stage in this particular research program is to relate these results to other results on the experience of the context of learning and the content of learning, to achieve a wider base of pedagogical theory to support the future design of such courses and subsequent tutoring.

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## Notes

1. All quotes are in the original form, no corrections have been made for spelling or grammar. Discussions were in English. Names have been changed and headers removed.
2. The identifiers consist of the group letter and the number of the contribution to the discussion.

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## Chapter 8

### Factors influencing students' orientation to collaboration in networked learning

MADELEINE SCLATER & KLARA BOLANDER

**Abstract.** This chapter examines the application of collaborative learning strategies advocated for online learning and uncovers what, in practical terms, occurred when students undertook an online module forming part of an MSc in Adult and Continuing Education at Glasgow University. Three separate forms of collaboration emerged when participants were asked to work together in three small project groups in order to write a joint paper. Groups presented papers that exhibited varying levels of cohesiveness in terms of outcome. Members of the groups also revealed differing levels of participation during the project work. An obvious tension thus arose between individual attitudes to work versus the requirement to collaborate.

This tension instigated an exploration of the conditions under which collaboration is likely to flourish or flounder and prompted the following questions: How can educators ensure that it is within every student's interest to contribute to group work? How should collaboration in networked learning be evaluated particularly where there is a clear institutional requirement to retain individualized forms of assessment? Whilst we recognize that there are a range of factors which create both affordances and constraints in collaboration, the aim of this paper is to examine the relationships between collaboration, assessment and motivation and to consider these in the context of learning.

**Keywords:** assessment, collaboration, competition, co-operation, motivation, process/product

### Introduction: co-operative and collaborative learning

In recent years there has been considerable interest in the application of collaborative methods within higher education and more recently within networked learning environments. There exists a considerable body of evidence to suggest the positive effects which such techniques have on achievement and motivation. Based on a review of 323 studies conducted over a period of 90 years, comparing the relative impact of co-operative, competitive and individualistic learning situations on achievement, Johnson and Johnson (1990, p. 26) concluded:

... generally achievement is higher in co-operative learning situations than in competitive or individualistic ones and that co-operative efforts result in more frequent use of higher-level reasoning strategies, more

frequent process gain, and higher performance on subsequent tests taken individually than do competitive or individualistic efforts.

In addition, Johnson and Johnson's findings conclude that co-operative methods are key in promoting intrinsic interest in learning tasks, when compared to students taught in classrooms using whole class methods, as well as in developing positive interpersonal and inter-group relations (Sharan, 1990, p. 200).

Our research builds upon existing work within the field suggesting that there is a number of contingent factors which effect participation in group work (Jones, 1998). According to Knight and Bohlmeier (1990) not only are there various methods in carrying out collaborative learning but there are also other influences to consider. These include the social influences on learning, the ways in which people learn, the ways in which group work is structured and introduced, the goal structure, use of rewards and/or individual accountability, the nature of the interaction between group members during the activity as well as the roles adopted by participants. Whilst all of these factors are important in encouraging and sustaining collaborative learning they are not guaranteed to influence academic achievement.

Johnson and Johnson (1990) point out that only under certain kinds of conditions can it be expected that group efforts will be more fruitful than individual efforts. They argue that it is not enough simply to place students together in groups and expect them to work together (Johnson & Johnson, 1990, p. 27). Group work, if not properly structured, can suffer from the 'free rider' effect where some group members tackle most of the work with little input from the rest of the group members – a phenomenon referred to as 'diffusion of responsibility' (Slavin, 1990, p. 16). This was a tendency we noted within the three collaborative project groups discussed later in this paper. This can occur particularly where groups are required to work on a single task (Slavin, 1990, p. 16).

Within recent co-operative learning research there is a degree of uncertainty about what is responsible for encouraging high quality, effective collaboration (Johnson & Johnson, 1990, p. 27). Webb and Palinscar (1996) acknowledge that the outcomes of group based learning have been well identified in terms of skills and basic concepts, but, they argue, more evidence is needed to demonstrate how collaborative learning can shape students' thinking, understanding and problem solving abilities (Webb & Palinscar, 1996, p. 867). Whilst much is known about collaborative learning within face-to-face groups there is a scarcity of research relating to the ways groups function online within an educational context (McConnell, 2000, p. 240). In this paper we are interested in exploring how the quality of collaboration might be

enhanced in networked learning by examining participants' experiences of collaborative learning.

For the purpose of this paper, we believe it is important to make the distinction between 'co-operative' and 'collaborative' learning since each strategy would involve a different kind of working together and therefore a different level of negotiation by participants. It would also imply the use of different kinds of assessment strategies such as individual, group based or a combination of individual and group based methods (Johnson & Johnson, 1990; McConnell, 2002; Slavin, 1990).

Several authors make a distinction between 'co-operative' and 'collaborative' learning (Koschman, 1996; Jones, 1998; McConnell, 2000; Webb & Palincsar, 1996). 'Co-operative learning' may be used to refer to people working together as a group to explore a topic through discussion and using the group knowledge building process as a way of furthering individual learning (McConnell, 2000). Schrage, however, views 'collaboration' as "*an act of shared creation or shared discovery*" suggesting a higher order of involvement that first requires the development of a shared understanding before new meaning or new knowledge can emerge (Schrage, 1990, p. 6). Koschman, on the other hand, views 'collaborative learning' in relation to situations where participants are involved in some form of group problem solving (Koschman, 1996, p. 13).

In both Schrage's and Koschman's definitions, 'collaboration' refers to a working together that is more focused and purposeful than 'co-operation'. Webb and Palincsar list six varieties of co-operative learning but maintain that there has been very little written with respect to collaborative learning. They argue that certain forms of co-operative learning can occur without collaboration but that it is usually understood that collaborative learning includes forms of co-operation. In their view the essence of collaboration is:

... convergence which involves the construction of shared meanings for conversations, concepts and experiences (Webb & Palincsar, 1996, p. 848).

The kind of activity to which we believe 'collaboration' refers is the situation in which members of a team work together to create a shared artifact. In the case of the MSc online module this involved small groups working together to write a joint paper.

When looking at more recent findings, we find the distinction made by Dillenbourg et al. (1995) the most useful. They claim that *co-operative work* is accomplished by the division of labor among participants (each person being responsible for part of the work) whereas *collaboration* entails the mutual engagement of the participants in a co-ordinated effort to solve a problem

together. It is not the fact of a division of labor which wholly captures the difference – because in all group activity people are taking on different roles at any time (e.g., speaker and listeners). Rather, the distinction depends upon the way in which the division of labor comes about. If it involves a (hierarchical) splitting of a task into independent subtasks then it is best described as co-operative work. Co-ordination is only required during the splitting up of the work and in assembling the partial results. In collaborative work, there may be a dynamic shifting or switching of roles, but fundamentally the group is involved in an effort to maintain and work upon a shared conception of the problem (Dillenbourg et al., 1995, p. 190).

In the following section we turn to the theory of learning and motivation to guide us in our efforts to understand the factors which encourage high quality collaboration in networked learning.

## Theoretical framework

### *Previous educational experiences*

The approaches to learning that students adopt are influenced by a number of interacting factors. These factors can be analyzed using Ramsden's (1992) model concerning students' 'learning in context', which we have used as a way of understanding the factors which influence students' orientation to collaboration.

Students' *previous educational experiences* combined with *the context of learning* such as teaching methods, curriculum and assessment all influence students' general *orientation* to studying, i.e., whether they are intrinsically or extrinsically motivated.

Together these would be responsible for shaping students' perception of what a task is demanding, i.e., seeking meaning (deep approach) or reproducing (surface approach) which in turn would confirm the approach or strategy students adopt to 'solve' the task (Marton & Säljö, 1976). Taken together these would influence the outcome. The model can be seen in Figure 1.

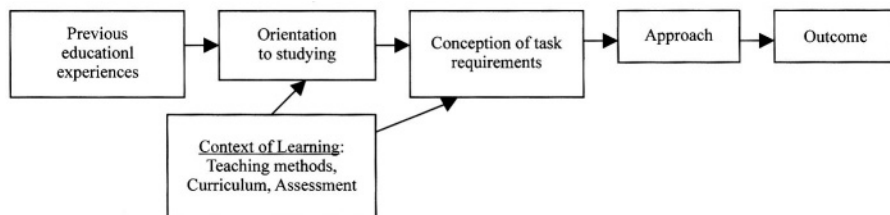


Figure 1. Ramsden's (1992, p. 83) model of student learning in context.

### *Extrinsic and intrinsic motivation in collaboration*

Having briefly discussed the 'learning context' as a way of understanding why collaboration in learning can be successful for some people and not for others, the next step is to look at how to make a task *valuable* to students in the context of collaboration.

Work can be important in various ways, each one producing a different kind of motivation depending on the context. Learners become 'extrinsically' motivated in situations where they are required to fulfill the requirements of others. Learners become 'intrinsically' motivated where they are learning for personal understanding or developing a sense of personal competence. For intrinsically motivated students, the point is to travel rather than arrive and this motivation can result in a deep approach to learning.

Various reward systems or incentive structures such as group or individual rewards or inter-group competition have been used in studies looking at motivation. Slavin (1990) argues that extrinsic rewards are needed to motivate students in co-operative learning groups whereas others such as Sharan (1990) argue that intrinsic motivation brought about by personal involvement in the co-operative tasks is enough to create a climate for high achievement. McConnell argues that this difference is a matter of educational perspective and advocates a philosophy of co-operative and collaborative learning based on intrinsic motivation rather than external rewards (McConnell, 2000, p. 25).

Intrinsic and extrinsic motivation can co-exist, but they often focus on different aspects of the task. Assessment generally acts as an extrinsic motivator encouraging students to focus their ways of learning appropriately, according to what is being assessed (Lepper, 1988).

### *Deep and surface learning*

Students' approaches to learning have been categorized in a number of ways. Marton and Säljö (1976) distinguished between 'deep' and 'surface' level learning, where 'deep' refers to a meaning-seeking approach, and 'surface' refers to a reproducing approach. Later, the achievement (or strategic) approach, aiming at achieving high grades, was added by Entwistle and Ramsden (1983). However, it has to be said that these categories of approaches to learning all stem from a situation where students work individually.

Recent research (Lonka et al., 2001) indicates that the 'deep' approach to learning may be re-evaluated in new, collaborative learning environments where a *collaborative-constructivist approach* may be viewed as an important learning orientation (Lonka et al., 2001). Thus 'deep learning' may be seen arising from learning situations where learners are involved in a form of 'collaborative knowledge building' where collaboration is used as the basis

for the negotiation of meaning between participants who, together, advance their knowledge and understanding of a particular subject (Scardamalia & Bereiter, 1996).

The issue of assessment acting as an extrinsic motivator raised, for us, the question of whether assessment can actually “push” students from a surface approach to learning to a deep approach to learning and vice versa.

In a study by Vermetten, Vermunt and Lodewijks (2002) it was concluded that students do not easily change or vary their learning strategies according to context. They also found that student groups with different learner characteristics tend to use instructional measures in different ways, such that they suit their own habits, ideas and preferences of learning well. These results suggest that students’ learning strategies are rather stable.

However, Lindblom-Ylänne and Lonka (2000) found that medical students who initially had a meaning directed approach to learning during their studies in a traditional medical curriculum, changed their study practices into a reproduction oriented learning strategy. It seemed that the learning environment had forced the students to study in a way that did not match their initial conceptions of learning (Lindblom-Ylänne & Lonka, 2000). These examples do not stem from a CMC environment, but perhaps it is possible that students in such an environment can also be influenced in their learning strategy to be more deep- or surface-oriented.

### *The expectancy–value theory of motivation*

Feather (1982) considered that there are two main factors, which make students wish to learn something.

1. It has to be important; it must have some *value* to the learner
2. It must be possible to do the learning task; the learner has to expect *success*.

Within the context of the collaborative exercise students were asked to undertake, this model is applicable in terms of explaining the orientations they adopted by looking at the *value* they attached to it. The *expectancy–value theory of motivation* resonates with our experiences of teaching particularly in relation to the reasons students do or do not wish to collaborate. It argues that if anyone is to engage in an activity, she/he need to both *value* the outcome and expect *success* in achieving it (Feather, 1982). If either one is not present, motivated activity does not occur. The theory thus suggests that a number of factors – such as students’ confidence, experience and values of how important an activity is to them – together form a background and influence the ‘orientation’ to studying that Ramsden mentions in his model.

Similarly, Sharan concurs that achievement prior to the implementation of co-operative learning will serve as a predictor of achievement in the future by



effecting motivation to learn (Sharan, 1990, p. 176). However, Sharan goes on to mention that both the suitability of the student's social orientation for the teaching method (whether collaborative or individual) as well as the student's social status within the learning context will affect student learning more significantly beyond the effect of the student's previous level of achievement.

If a student has a history of successful engagement with online collaborative learning the student builds up the knowledge base needed for deep learning and develops the expectations that give confidence for future success. However, if a student undertakes networked learning for the first time, this experience can sometimes cause a great deal of anxiety since there is little upon which to base their expectations of future success. Attributions of success are also sensitive to feedback from tutor and peers. By providing feedback from both tutor and peers about the process, as in formative assessment, belief in future success and intrinsic motivation is encouraged (Biggs, 1999; McConnell, 2002). This is in line with recent research where there is recognition for assessment systems that support and reward collaboration and active involvement of learners (McConnell, 2000, 2002; McConnell, Hardy & Hodgson, 1996; Reynolds & Trehan, 2000).

There is a strong theoretical basis for predicting that co-operative methods which use group goals and individual accountability will increase student achievement (Slavin, 1990, p. 16).

*Achievement motivation*, which gives an opportunity for ego-enhancement, and *social motivation*, which is concerned with what people value, can be added to the categories of extrinsic and intrinsic motivation. Together these four forms influence how a task is *valued* (Feather, 1982). We have summarized the expectancy–value theory of motivation in diagrammatic form as shown in Figure 2.

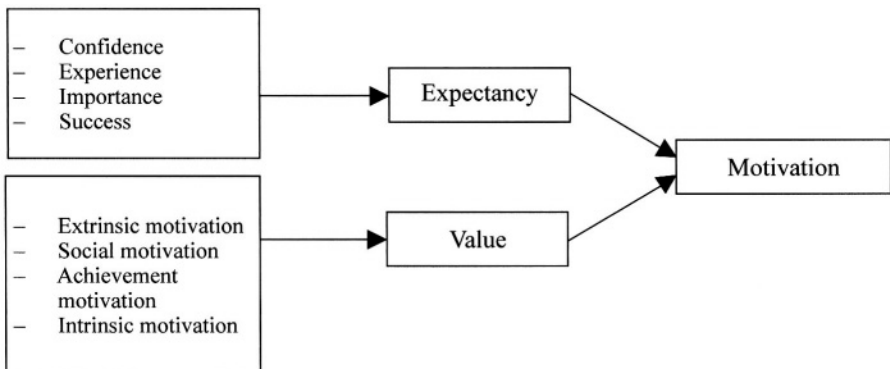


Figure 2. Expectancy–value theory of motivation (Feather, 1982).

In order to understand what makes collaboration successful we have drawn from research on learning strategies and motivation and have identified a number of interacting factors that, we believe, are responsible for determining the quality of collaboration. We will now discuss the background and context of this case before moving onto the methodological approach, results and discussion of the findings.

## **Background: new technology and lifelong learning module**

### *Design and assessment methods*

The MSc in Adult & Continuing Education at Glasgow University, which is offered as a campus-based course, recently developed and implemented a new networked learning module entitled “New technology and lifelong learning”. To date, the module has been offered for four consecutive years since its introduction in 2000. This paper concerns the cohort of 2001.

The aim of the module is to enable participants to appreciate how electronic communications and the Internet might be used to develop and sustain their professional practice. The module’s emphasis is on developing knowledge and understanding of the learning potential of the Internet – how it might be used to facilitate learning – and not simply on the technology.

Participants experienced new ways of learning by engaging in dialog in pairs or groups of varying sizes to reach new understandings in response to a range of identified topics. A term emerging to describe this kind of learning is collaborative ‘networked learning’ where the emphasis is on linking dispersed learners, tutors and resources and on ‘co-operation’ and ‘collaboration’ where students work together as part of a learning community, sharing expertise, responsibility and resources (McConnell, 1998, p. 7).

The online module, which is 18 weeks in duration, is the only networked learning module available to students undertaking the MSc, and is offered during the second and third UK academic terms. Course participants attend three campus-based workshops – one at the beginning, one in the middle and one toward the end of the module. In between these workshops the course is supported by a computer conferencing system into which participants log. The design of the course can be summarized as follows.

### *Term II (January–March 2001)*

During Term II of the module students participated in two discussions – one large group and one smaller group discussion. Each group ran for approximately three and a half weeks. During this term participants were individually

assessed against a set of institutional criteria and were asked to submit several short pieces of writing to the conferencing system at the beginning and end of each discussion. The tutors marked the assessments.

### *Term III (April–June 2001)*

During Term III of the module participants worked together in a much more concentrated way by splitting into smaller groups (comprising two or three people) to explore a topic of mutual interest, with the aim of writing a joint paper. The 'collaborative study project' was divided into two phases, a 'co-operative phase' and a 'collaborative phase' where a combination of an individual and a group mark was awarded. It was necessary to divide the project into two phases in order for members of each group to 'get to grips' with the subject material and to 'pool' and share their contributions before attempting to amalgamate their individual pieces of writing into a joint paper. Our research centers on the activities of Term III.

### *Course team expectations and collaborative project introduction*

The rationale for the introduction of the collaborative project was to shift from a less hierarchical to more open, critical and participative approach to learning and teaching where the emphasis is on learning from each other in groups.

During the second campus-based workshop (Term II) participants were introduced to the two-stage process of the collaborative study project. The rationale for the project was explained and guidelines on how to begin were discussed. We outlined our main expectations of what we hoped would occur. This was for group members to work closely together during both stages and for everyone to invest equal amounts of effort in the enterprise. Later, participants were asked to nominate a topic and three teams were formed on the basis of overlapping subjects of interest. Prior to the start of the project further detailed guidelines were provided via the conferencing system.

During Phase I participants were asked to brainstorm ideas relating to their chosen theme and to then flesh out related yet separate strands which each person within the group individually pursued. Whilst this was a phase where each group member was responsible for their own 'strand', they were asked to work closely together to ensure that their individual pieces of work remained linked. Participants were given a period of four weeks for this initial phase, before submitting a 2000 word paper on their chosen strand to the conferencing system. The tutors awarded an individual mark for this, which amounted to 30% of the final module total.

During Phase II of the project, teams came together over a three week period to negotiate and amalgamate their separate strands into a joint paper to which a group mark was awarded based on the final artifact. This group mark amounted to 20% of the final module total.

We hoped that by structuring the activity in this way course participants would find themselves in a position whereby they simply had to work together in order to create the joint document. So, in other words, the course team expected that high levels of collaboration would naturally occur as a by-product of having to combine the different pieces of work. However, on completion of the activity we realized that whilst we were asking participants to collaborate, for some groups, this clearly turned out to be no more than a copying and pasting exercise undertaken by one or two people.

### **Methodological approach**

For the purposes of this paper we concentrate on the qualitative data gathered from interviews and the online transcripts. Additionally we use selected quantitative data to illustrate the level and frequency of messages sent within and between the three groups during the collaborative project.

#### *Quantitative data*

To examine the factors influencing students' orientation to collaboration it was first necessary to build a picture of each of the group's activities during the collaborative study project. We turned to the conference transcript to examine the frequency as well as the kinds of messages (message types) sent between group members during this particular phase.

We recognize, however, that the conference transcript is unreliable in the sense that it is only a record of the activities entered into the conferencing system, thus providing a limited account of what occurred (Jones, 1998). Many of the groups used an alternative means of communication to the conferencing system, some preferring to meet up face-to-face whilst others exchanged private e-mails and used the telephone. We also acknowledge that examining the number of messages entered into the system is not an accurate method of ascertaining whether co-operation or collaboration occurred. Nevertheless we have used this approach to construct a rough profile of what occurred in each group during Phase I and Phase II.

### *Qualitative data*

Once patterns of activity within and between the groups had been established the next step was to understand the collaborative process from the participants' viewpoint by way of in-depth interviews and to 'make sense' from a naturalistic research perspective (Koschman, 1996, p. 15). The qualitative data, in the form of in-depth interviews and extracts from the online transcripts, was gathered and analyzed from an interpretivist perspective.

Interpretivists believe that human phenomena can be apprehended in terms of social constructions of meaning that are time and place bound rather than as universal laws. Since one individual's perception of meaning in a particular situation is likely to differ from another's it is necessary to present both in order for an understanding of 'the whole' (Greene & McClintock, 1991, p. 3). The idea of social research as an interpretive task which centers on the meanings of everyday interactions is fundamental to Ference Marton's phenomenographic approach to research in higher education (Marton, 1994; Richardson, 1999).

Broadly speaking, the methodological basis of our research has its roots in the phenomenographic approach described by Marton (1994) and Richardson (1999) and is an approach advocated by others researching experiences of online learning (McConnell, 2000). Phenomenography attempts to describe qualitatively the lived experiences of individuals and the way they experience and perceive a phenomenon. Marton defines phenomenography as:

The empirical study of the differing ways in which people experience, perceive, apprehend understand or conceptualise various phenomena in and aspects of the world around them (Marton, 1994, p. 4425).

The phenomenographic approach thus relies on participants' discursive accounts of their own experiences and their conceptions of the world. The principal aim for the researcher is to classify and to discover *differences* in people's experiences of reality (Richardson, 1999, p. 65). Marton made the proposal that the phenomenographic interview could serve as a means by which aspects of a person's experience could be thematized (Richardson, 1999, p. 70).

### *Analysis of interview data*

Having been involved in both the teaching and research of the module, we attempted to reveal an insider's perspective – that is to describe how participants experienced the phenomenon of collaboration on the module. A total of nine students participated in the module during 2001, all of whom were interviewed by one of the authors.

The interviews were semi-structured. They contained open ended questions with each interview lasting approximately one hour. During the course of the interviews participants were asked to reflect on their involvement in the module over the two terms. During the interviews we did not adopt a skeptical attitude toward the accounts of interviewees, rather the accounts produced by the participants were accepted at face value with our own preconceived ideas 'bracketed' (Marton, 1994, p. 4428).

We began by organizing the data according to topic or phenomenon. The next stage was to analyze participants' particular ways of understanding the phenomena in question. Here we focused on both the *similarities* and *differences* between the ways in which the phenomena appeared to the participants. This involved looking at the interview transcripts in their totality and extracting similar excerpts from participants on each phenomenon. These were then 'pooled' together in categories. We dealt with the differences in the same way by juxtaposing varying views of the same phenomenon; these were also placed together in categories. The categories arose from the comparisons within the data itself rather than having been defined in advance and imposed on the data.

Once the grouping of relevant quotes had been undertaken within each category our focus then shifted from the relations between the quotes themselves to the relations between the groups of phenomena or 'categories of description'. A hierarchy was then established between the different groups of phenomena (Marton, 1994, p. 4428).

We then turned to the online transcripts and attempted to 'match' or group participants' conceptions of particular phenomena gleaned from the interviews with what participants actually said to each other online during Phases I and II. The quantitative data was then used to visualize the level of communication in each of the three groups as well as to compare the level of communication between participants in each of the groups. In this way a process of 'triangulation' was applied to the data. Triangulation may be described as

... the independent implementation of two or more methods with offsetting biases to counteract the weaknesses in each (Greene & McClintock, 1991, p. 18).

As Marton points out, the processes which we describe have to be taken interactively because:

...each consecutive step has implications not only for the steps that follow but also for the steps that precede it, the analysis has to go through several runs in which different steps are considered to some extent simultaneously (Marton, 1994, p. 4429).

Researchers may question the reliability of the analytical method described by asking whether it could be replicated by other researchers with the same results. According to Marton such a view is tantamount to seeing the analysis as a kind of 'measurement procedure' (Marton, 1994, p. 4429). It should rather be seen as a 'discovery procedure' which does not need to be replicable. Richardson puts forward a point made by Säljö who says that researchers using phenomenography should recognize that the categories of description which they create are their own constructions and that other researchers looking at the same evidence may arrive at different categorizations (Richardson, 1999, p. 68).

### **Experience and outcomes**

The following section will consider the collaborative experiences of the three groups. As has already been mentioned, a distinct path was chosen by each of the three groups to arrive at the joint paper. After the analysis of the data, each group was given a name according to the approach that was adopted. The method of working of each group will be discussed drawing upon the evidence of their online communication with one another as well as information from the interviews.

By exploring what occurred in each project group we will aim to understand what the participants experienced, and in doing so we raise the issue of *value* in the collaborative project, bringing into question the focus on the end product – the joint paper – for the purposes of assessment. Although the primary focus will be on the 'collaborative phase' of the joint project, for which a group mark was awarded, the 'co-operative phase' will also be considered. The two phase approach was adopted to give group members better preparation for collaboration. This raised the question: is it fair only to assess the end result and did it accurately reflect what it was the course team wanted to achieve? The three groups can be summarized as follows.

1. *Core-amalgamation*: One member drafted the joint paper on behalf of the group basing it on his first paper and although other people contributed ideas the final paper remained similar to his first paper.
2. *Negotiated collaboration*: An elected scribe wove together the contributions of the group members, producing a paper which read with one voice.
3. *Cutting down and stitching together*: Tasks were shared out amongst group members, who each contributed a section to the paper and discussed how these should be integrated. One person did most of the editing but another submitted the final draft without further consultation.

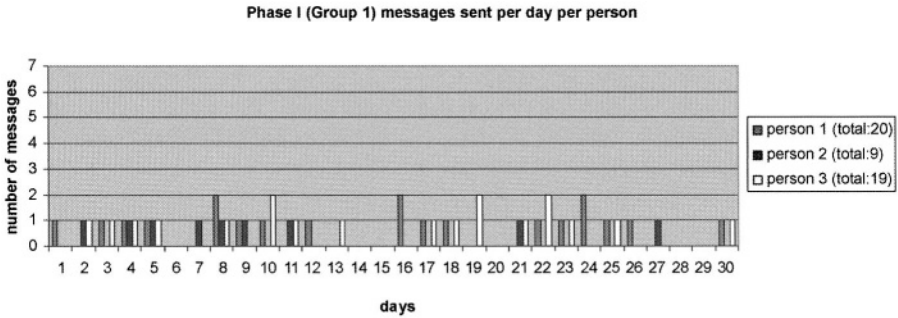


Figure 3. Graph illustrating number of messages sent per day per person (Phase I: Group 1).

The experiences of each group will be considered separately before these observations are brought together in the discussion.

*Group 1: ‘Core-amalgamation’*

The level of communication that occurred during Phase I could be described as highly co-operative in the sense that participants communicated with each other on 24 days out of the 30 day exercise. This group sent an average of 1.7 messages per day over the thirty days. However, despite the consistent level of communication between participants during Phase I not all group members were equally involved. The conferencing system was used frequently throughout the project by Participant 1 and Participant 3 with Participant 2 remaining on the periphery. P2 entered the least number of messages and was less active due to difficult personal circumstances that were affecting their ability to participate. Given that the first phase of the group based project was individually assessed with each person submitting their individual ‘strand’ based on a common theme, it was surprising to see such high levels of communication occurring between P1 and P3. This was noted by P3 who took on the role of group leader during Phase II.

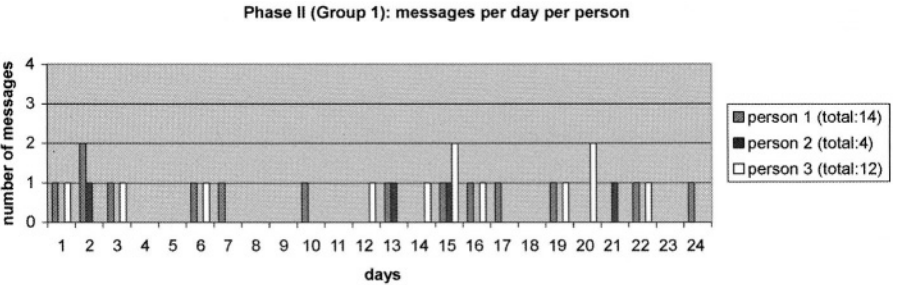


Figure 4. Graph illustrating number of messages sent per day per person (Phase II: Group 1).



This sharing of knowledge and understanding was particularly evident in the way that our peers directed us to much of the information we needed and explained things from their point of view. I think it is the case that an individual producing a paper may have a considerably narrow perspective as many viewpoints expressed by the others would not have occurred to me independently. (Online reflection.)

During Phase II this group went about the joint paper by using a 'core paper' into which the two other papers were amalgamated. It is perhaps no coincidence that the person who opted to function as the group 'scribe' (P3) selected their earlier paper as the basis for the final paper. The 'scribe' effectively wrote the entire paper including the introduction and conclusion despite asking the others to take on the responsibility for these sections.

You will see after this note an amalgamation of all our work as discussed. I have used my essay as the foundation ... I have inserted relevant parts of your essays as I thought best ... A's bits are in blue and B's bits are in red. (Online transcript.)

Tensions arose particularly over time management and lack of input from the others when it was most needed. This is a point which we later discuss. From the online transcripts the self-appointed 'scribe' (P3) was the only person really involved in writing the final paper which, in fact, looked very similar to the earlier, individual paper that was submitted.

From the interviews with participants and from the online transcript we would argue that it is easier for participants to work in a co-operative situation, where people are responsible for and in control of their own work, compared to a collaborative one where higher levels of co-ordination and negotiation are required. In all three groups, communicative activity was higher and more evenly spread over the 30 days during Phase I compared to Phase II. Lower levels of activity are especially noticeable in Phase II where group members had to amalgamate their individual efforts. In response to how they felt about Phase II of the project the scribe (P3) replied:

Personally, although I enjoy communication in summative work. I like to control my own pace towards a deadline and definitely prefer writing quickly as opposed to drafting and redrafting in the light of other's contributions and perspectives.

P1 also expressed their difficulties with respect to Phase II of the project and said:

I think one problem is ... because everyone thinks a different way we therefore have to think how to organise our topic ... I will write my part

and (P3) will write their part and (P2) will write their part down. How do we organise this?

When asked how successful they considered Phase II, P3 replied:

It was difficult to make it read smoothly because it was a pastiche ... I think it needed a bit of work putting into it to smooth out the joins.

The same question was posed to P2 who said in relation to the outcome:

I thought it was excellent but in all honesty I felt that there was not much of me in there because of all the problems that I said that I had had.

Despite describing our expectations for both stages of the project and providing clear guidelines on how we imagined the activity to unfold we did not envisage that the final collective piece of writing would result mainly from the efforts of one individual. P2 admits that she thought the final paper was good but did not feel very involved. P2 writes:

I've been reading your efforts and very grateful indeed for all your hard work. What do we do now? ... As I have done b \*\* all I am afraid to make too many comments in case you are offended. Tell me what you want to do and I will do it. (Online transcript.)

It is interesting to note that P2 felt that the scribe might be offended if she offered comments at such a late stage particularly since she had contributed very little to the final document. We suggest this points to a general lack of ownership on her part with respect to the joint paper and raised, for us, the question of how to ensure that collaboration is *valued* by all participants. It also forced us to consider the purpose of the joint paper when, in effect, what resulted was the work of one individual. However, despite the end result this group displayed the most consistent level of communication during Phase II (the 'collaborative phase') having entered messages on 17 out of the 24 day period compared with Group 2 (8 days) and Group 3 (12 days).

#### *Group 2: 'Negotiated collaboration'*

This group entered the highest number of messages into the system during Phase I with Participant 6 being the most active. Compared to the other groups the messages were less evenly spread; they communicated on 22 days out of the 30 day project. However, they sent an average of 2.87 messages a day in contrast to Group 1 (average of 1.7 messages per day) and Group 3 (average of 1.6 messages per day). Unlike the other groups this group communicated both through private email and through the conferencing system as Participant 5 was unable to access the system.

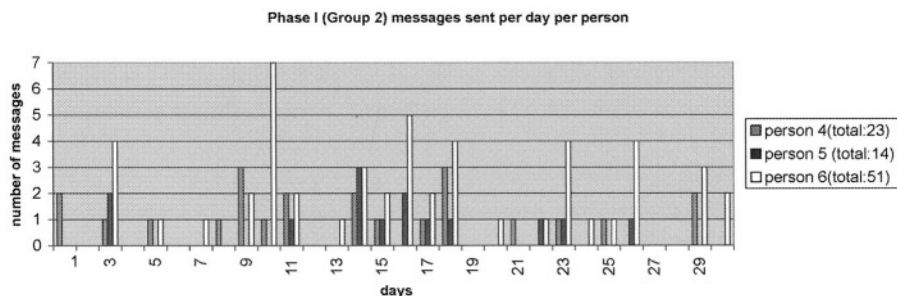


Figure 5. Graph illustrating number of messages sent per day per person (Phase I: Group 2).

The group nominated a scribe (P6) who carefully read through the work of the other group members and pulled out the most significant parts. It is therefore not surprising that the scribe is seen to enter the highest number of messages in this group. In response to the approach taken for this paper P6 says:

The first essay was mine. I took the three essays and read them through two, three, four times and I tried to see what in each essay was new.

In the case of this group it appeared that the one who opted to take charge of the final document (P6) was the one who seemed the most satisfied with both the process and the product. An alliance formed between P6 and P5 with P4 remaining on the periphery for much of the project.

But I tell you the fulfillment I had was very good ... I felt an alliance, because I knew she was struggling and that was clear because she told me and we exchanged a few exchanges telling each other lets encourage each other ... it was the most meaningful aspect of the course.

P4 remained on the 'edge' of the project despite the fact that this person was the second most active person out of all the three groups. This was noticed

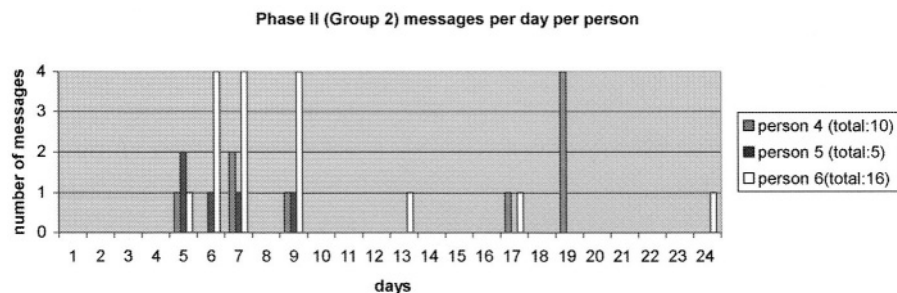


Figure 6. Graph illustrating number of messages sent per day per person (Phase II: Group 2).

particularly by P5 who said in response to a question relating to whether she felt everyone was equally involved:

Yes certainly. I think so. In fact myself and P6 more than P4.

The course tutors felt that out of all the groups, this group displayed the greatest degree of cohesion in terms of outcome however not everyone within the group felt satisfied with what had been produced. It is perhaps no coincidence that the person who remained on the periphery (P4) of the action seemed less comfortable with both the collaborative process and the collaborative product. This seemed to be to do with reconciling individual styles of writing in the final paper among other factors such as just wanting to get the job done without involving unnecessary amounts of negotiation. P4 writes:

We did not have a clear goal of getting this joint essay in ... it was kind of frustrating having to do all this negotiating – it felt like being in a committee and it's good for some things but not for everything.

The scribe however expressed an opposite view and said:

It was fulfilling from the emotional and psychological point of view ... the most important thing was the process; just trying to adjust to one another, go at the same pace, find a rhythm to work together.

This led us to believe that group work can appear successful in terms of a product but may not, for some people, reflect a positive experience in terms of process.

Whilst Group 2 reflected a high degree of negotiation between its members in Phase I they reveal a less even pattern of communication over the 24 day period in Phase II compared with Group 1 and Group 3. In fact, they communicated on only 8 days compared with Group 1 who communicated on 17 days and Group 3 who communicated on 12 out of 24 days. Thus for this group, Phase I seems to have involved considerably more communication between its members than Phase II. From our analysis we began to question the emphasis on content for the purposes of assessment particularly since this group exhibited very high levels of communication during Phase I which, effectively, went unrecognized in assessment terms.

### *Group 3: 'Cutting down and stitching together'*

This group sent the least number of messages during Phase I, however, their communication was more evenly distributed in the sense that they communicated on 25 out of the 30 day project compared with Group 1 who communicated on 24 days and Group 2 who communicated on 22 days.

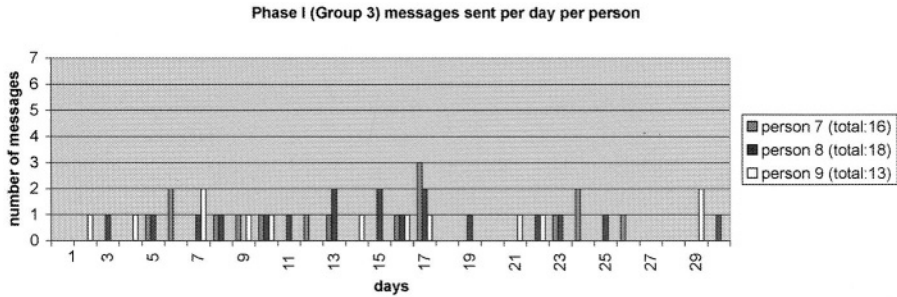


Figure 7. Graph illustrating number of messages sent per day per person (Phase I: Group 3).

Unlike Groups 1 and 2, this group made a conscious decision not to appoint a group 'scribe' since the group was keen to ensure that the collaboration remained democratic. Compared with Group 2, this group was eager that the final paper should not reflect 'one voice'.

There was no owning one voice and I think we took the decision quite early on not to have someone as the leader.

The group's tasks were shared out with participants opting to undertake whatever job was necessary at the time. In contrast to the other groups, each person within this group was responsible for cutting down their existing paper with the result that the final paper consisted of three major sections which reflected the distinct style of each individual with the addition of an introduction and conclusion.

... I think that our work should be a collection of 3 pieces which are related to each other ... (Online transcript.)

Interestingly, on occasions this group chose to meet up face-to-face in order to ensure that the separate strands remained linked. Participants kept up close contact with each other during Phase I, sharing and reciprocating ideas re-

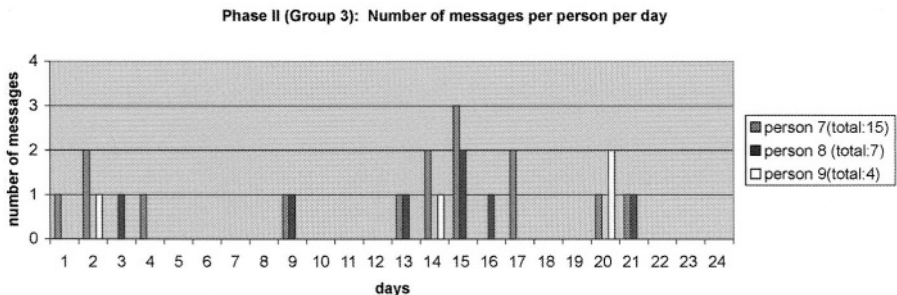


Figure 8. Graph illustrating number of messages sent per day per person (Phase II: Group 3).

lating to their individual findings. However co-ordination of activity became more difficult in Phase II when the third group member (Participant 9) was out of touch for a few days and had not yet submitted her contribution to the group.

When asked about how the study project went Participant 7 who eventually felt compelled to take charge of the editing said:

I think as we started to pull it together I got a bit fed up. P8 just cut some pieces and shoved it in and said 'right deal with it', ... and that was as much as was done and again if that was how we were going to carry on I would have said ... hey, wait a minute.

Like the previous group, timing and issues linked to the final handling of the document arose. The 'scribe' (P7) discovered that there was far more editing to be done than he originally anticipated in Phase II. He also had to relinquish control of the final document to the third member (P9) who then added their section and submitted the final piece without further discussion. In terms of outcome the collaborative paper was arguably the least cohesive paper yet the group exhibited more equitable levels of involvement during Phase I compared with Group 1 and Group 2 yet unfortunately in terms of assessment their efforts to co-operate were not recognized.

### *Participants' directed activity: 'Spontaneous collaboration'*

At the time when groups were formally engaged in their projects, Participant 3 set up a voluntary 'leisure' group in the online cafe and initiated a collaborative creative writing exercise called a 'relay story'. This involved one person creating a piece of fictitious writing and inviting others to contribute to the development of the story. Five participants contributed to the story. This ran in parallel to the collaborative study project. We would argue that this was the most successful demonstration of collaboration during the module in terms of process as those involved clearly seemed to be highly motivated and keenly valued their own participation in the project.

I loved it and I thought it was great! It was really nice light relief from the project.

It was essentially this that prompted us to question what motivates people to work collaboratively.

## Discussion

### *Previous experiences*

In the context of an online collaborative writing task, Ramsden's model would suggest that students' previous experiences of learning might influence their orientation to the collaborative task. This might, for example, include previous experiences of working online, how comfortable students are in expressing themselves through writing, time management and either positive or negative previous educational experiences.

From the interviews it became clear that previous experiences might have contributed to the level of responsibility students were prepared to take in the knowledge building process. One of the participants (P2) from Group 1 did not have previous experience of learning or working within an online capacity and mentioned difficulty in conceptualizing what it was that was required of her.

By contrast her team colleague (P3) was used to using e-mail in a work context and therefore was possibly more in tune with what was expected in terms of negotiation. It is not perhaps surprising that he assumed the 'group leader' role.

I think I am used to using emails at work and it's a similar sort of thing ... you know sending emails to about six people and getting various responses to what you have said. So that was quite similar. It was not something new.

On several occasions P2 mentioned that her preferred method of learning was through face-to-face teaching and seemed unable to release herself from her previous experiences of classroom-based learning. This, among other factors, may account for her low levels of participation during the collaborative project.

I would much rather work in a face to face environment, that is my chosen way of working and that is my preferred way of working ... I felt it difficult in that it was not my chosen way of working ... for me it was just an experiment.

From the interviews with module participants the issue of writing style seemed to be a constraint in collaboration. For example, P4 of Group 2 mentioned difficulty in knowing how to reconcile the differences in writing style and admitted to feeling happier submitting work for which he was solely responsible. This might account for the 'back seat' approach he took throughout the collaborative project because he did not feel he had ultimate control over the final document.

The most difficult thing was dividing the essays because people have different ideas of what should be done and because I write in a certain way, P5 writes in a certain way and P6 writes in a certain way and to be honest the final result was just a mess ... I would rather hand in a piece of work that was my own ...

Other factors linked to 'previous educational experiences' that impacted on participants' level of interaction in the collaborative enterprise relate to issues of time management. This was a particular frustration experienced by P3 who mentioned the difficulty in co-ordinating and accommodating the time schedules of his group.

... [I]f you have a sort of deadline I like to get it in before it and not run up to the deadline.

As we have just illustrated, previous educational experiences and personal working/study methods appeared to influence participants' orientation to collaboration in various ways. However, we are unable to pinpoint the variables that were responsible for activating particular orientations within participants.

### *The impact of assessment on collaboration*

From the interviews it also became evident that the 'teaching context', and more specifically, the assessment methods had a significant influence on the particular orientation of participants in the collaborative enterprise.

Phase II of the joint project (where a group mark was awarded) proved to be to be more complex than it was considered at the outset. Participants were required to engage in work that involved high levels of negotiation and communication yet the university requirement for individualized forms of assessment failed to recognize the levels of negotiation needed to arrive at the final outcome. This was noted by a couple of participants.

I think the assessment that was being used was not really exploiting or nurturing the kind of things that could have happened ... the whole assessment structure (ought to be) in the spirit of the whole process rather than what the individual produces.

... What I would expect is that the mark will depend a lot on the process along the way ... the most important thing is the process, the sharing, all the rest is secondary. The most important thing, what remains to me is the struggle and the process and effort and the outcome. The mark is something which someone else gives.



In the interview with P7 the issue of group marks was discussed. The following illuminates a duality in the collaborative process: the desire to make a good job of the paper because it was to be critically reviewed by the cohort and a realization that the collaborative paper only amounted to a small percentage of the marks.

... [A]t the end of the day the marked part of that was not so bad because there were not a lot of marks attached to that ...

An opposite view can be seen in the response to a question about how successful the collaborative project had been. It seemed extraordinary that this person was unaware of the assessment requirements for this particular phase of the module.

I did not think about how it looked. I just felt so happy with it. I mean I don't even know if this is going to be marked or not?

Clearly this participant did not appear to be motivated by the prospect of obtaining a group reward – a final group mark – but was intrinsically motivated by the process of engaging in group work. The joint paper thus acted as an extrinsic pressure because it was a piece of assessable work; for some participants it *remained* an extrinsic pressure in the sense that they did not derive any pleasure out of the process, whereas for others it also became an intrinsic motivator.

It soon became evident that in most cases, individualized forms of assessment appeared to orient participants toward individual, competitive attitudes to work rather than collaborative ones and that there was a need to develop new criteria to assess collaborative activities that would, in effect, take into the account the process.

### *Course design*

In the module, an effort to deal with the problem of individual versus collaborative orientations to group work was made by dividing the mark so that both individual and group contributions were assessed. It was perhaps an unrealistic assumption on the part of the course team that participants would simply work together. We introduced an element of individual accountability into the process so as to avoid the 'free rider' effect. Yet despite this strategy there were some participants who appeared to have low involvement throughout the project.

Our hope was that by awarding a group mark to the collaborative project participants would be pushed toward adopting an intrinsic approach so that they would have the group's interests at heart. However, looking back it is

questionable whether it is possible to use assessment *per se* to push someone toward intrinsic motivation. It is perhaps possible that one can encourage participants to act in ways which are more consistent with the interests of the group and one can perhaps discourage them from approaches to study other than those one values.

Whilst some participants clearly adopted a 'deep' approach to the project and thus became interested in the process for its own sake, others had a more strategic attitude. The participants who took the latter approach seemed less concerned with the collaboration process and more concerned with 'getting the job done'. Despite designing an activity to include opportunities for both individual and group assessment – which we hoped would encourage more equitable levels of participation – the problem of participants shouldering more responsibility than their counterparts still remained.

## Conclusion

Having outlined what occurred in each of the collaborative groups and recorded the impressions of those interviewed it has become evident that there is a complex web of interacting factors which influence students' orientation to collaboration. Whilst we believe that these factors should not be viewed in isolation, the research findings suggest that there is a need to foreground the most significant factors. On the basis of feedback from participants we consider that the assessment strategy had the greatest impact on the approach students adopted in the collaborative project. Our central question has been: "What motivates students to collaborate?" We have used Ramsden's model of 'learning in context' and Feather's 'expectancy-value theory' of motivation as a way to address this question.

Several different kinds of working practices emerged in relation to the three groups. In Group 1, there appeared to be little collaboration between group members during the final phase although during the earlier phase of the group work at least two of the group members remained in close contact with one another. The paper produced by this group seemed to reflect very little input from the other group members. In Group 3, participants seemed to be more or less equally involved and displayed high levels of co-operation. Despite the high levels of activity this paper did not, unfortunately, reflect the level of cohesion, which ought to have resulted given the level of personal commitment to the enterprise from all its members. In Group 2, a wholly new paper was produced. This was considered to be the most successful paper in terms of outcome but in reality the creation of the paper only appeared to involve two of its members working in close collaboration; the third group member remained on the periphery for most of the paper.

These findings led to the question: "Which was the most successful group?" This of course depends on how success is viewed and, ultimately, what is being assessed. Clearly in terms of outcome Group 2 was the most successful regarding its reporting skills, yet Group 3 was the most successful in terms of process as it involved more equitable levels of participation particularly during Phase I. Group 1 could be considered to be the least successful in terms of its outcome as it failed to reflect the 'voice' of its other group members but nevertheless they displayed high levels of communication between two of its members during Phase I.

What stands out in relation to the three groups is that collaboration occurred at different stages of each group's history, yet the assessment structure failed to account for this, even though a combination of individual and group based assessment was used. This prompted us to look at more holistic ways of evaluating project work and to question what it is we wished participants to learn from the experience. Was it about the experience of learning together or was it about demonstrating good reporting skills? In relation to the problem of what motivates students to collaborate we believe that both the outcome and process ought be *valued* as both are very important for success in collaboration; the process gives focus to the outcome and vice versa (Johnson & Johnson, 1990, p. 28).

One obvious way of ensuring a task is *valued* is by looking at how the activity is introduced, being encouraging, showing interest and asking questions in a way that is not inhibiting, thereby creating an openness in the educational process and within the learning community at large. Other ways could include providing opportunities for self-determination in learning, ensuring that there is a real purpose to the collaborative process and by introducing collaborative forms of assessment in learning (McConnell, 1998, p. 5). This is in line with research which stresses the need for (a) regular group processing and (b) helping participants to develop a sense of felt responsibility not only toward the learning of the 'online community' but also the welfare of the group (Johnson & Johnson, 1990, p. 31). We believe that if the process of collaboration is highly *valued* by other people important to the participant – for example their peers as well as their tutors – then learning may take on an intrinsic importance thereby motivating them to collaborate.

As we illustrated earlier, several participants felt that there was too much emphasis placed on the outcome. We suggest the introduction of other criteria that would take into account commitment, participation and reciprocal cooperation and collaboration. This might signal to participants that the experience of teamwork is equally valuable. We would therefore like to reinterpret Ramsden's model by combining it with Feather's 'expectancy-value theory of motivation' in order to explain the role of assessment and its relationship

to motivation in the context of collaborative learning situations. This can be summarized as follows.

As we have already discussed, in order to motivate students in collaborative learning situations the collaborative activity needs to be of *value* to the learner and simultaneously learners need to feel that they can cope with and expect *success* in the activity. To make the collaborative activity important to learners some kind of 'acknowledgment' for effort is usually given in the form of an assessment. The assessment, depending upon *how* it is structured and suited to the collaborative activity, can help shape students' approach to the activity in particular ways. It is at this point where we would suggest a combination of individual and group based assessment which acknowledges both outcome and process.

If the assessment is well conceived, the assessment methods in combination with other aspects of the design (teaching methods and curriculum) can encourage participants who start off in a position where they are extrinsically motivated, to adopt an intrinsic approach toward the collaborative task. Therefore extrinsic, intrinsic, social and achievement motivation (Feather, 1982) may be linked to the *value* students see in a task and, according to the approach that is adopted, will positively or negatively effect the 'quality' of the collaboration. Simultaneously we suggest that the quality of the collaboration will effect the level of motivation. Figure 9 below combines Ramsden's (1992) 'learning in context' model and Feather's (1982) 'expectancy-value theory' model to illustrate the relationship between assessment and motivation in the context of collaboration.

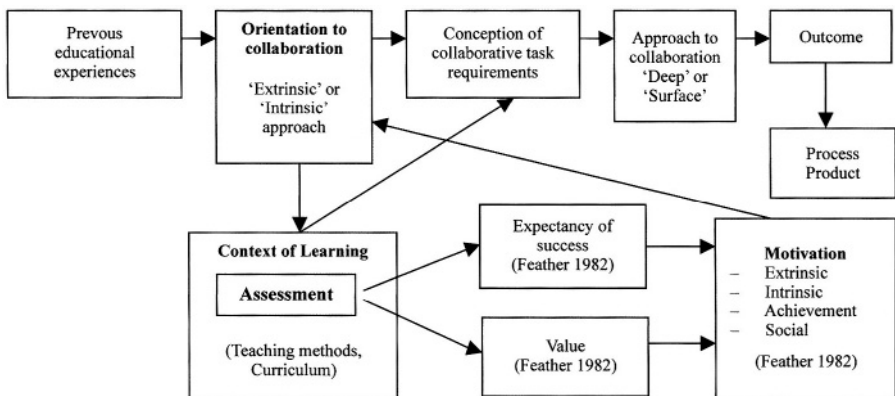


Figure 9. Diagram combining Ramsden's (1992) 'learning in context' model and Feather's (1982) 'expectancy-value theory' model illustrating the relationship between assessment and motivation in the context of collaboration.

## Summary

Whilst we have focused this paper on the problem of assessment and motivation in collaborative activities we recognize that these need to be seen against a background of interacting factors.

The implications of the research would suggest that there is a need to rethink traditional individualized assessment strategies in situations where more participative approaches to teaching and learning are being introduced, particularly in relation to group based assignments. Although group based methods of assessment were introduced during Phase II of the project (the joint paper) this only amounted to a very small percentage of a student's mark, which was assessed only by the tutor. Some participants were clearly relieved that their participation was not being assessed whereas others wished to see their levels of involvement being acknowledged in a formal sense. This raises the question of how to assess individuals' participation in networked learning situations. Inevitably this means the adoption of a more open, consultative approach to assessment between students and tutors. Whilst we recognize that individual, peer and a combination of peer and tutor assessment is already well established within networked learning programmes elsewhere (McConnell, 1998; Reynolds & Trehan, 2000), it is a challenging step that many institutions need to take.

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## Chapter 9

### A personal inquiry into an experience of adult learning online

SARAH J. MANN

**Abstract.** In this paper, I offer a reflection on my personal experience of networked learning using the approach of personal inquiry. I address the issue of identity and my experience of presenting myself online; my experience of participating in the formation of the learning group; and what I describe as the ‘weight of the words’, my experience of using this new medium of communication. I follow this with a theoretical exploration which attempts to understand these aspects of my experience. I argue that in the networked learning environment, the taken-for-granted processes of identity work and group formation are disturbed. The unease provoked by this requires greater effort toward the establishment of identity and group, whilst at the same time opening up the possibility for more fluidity and openness to the other. In my experience as a learner, the newness and uncertainty of the experience compelled me toward seeking certainty and closure. I was not able to make best use of the opportunity for the greater fluidity and openness offered by the networked learning environment. I close the paper by suggesting how teachers may be able to support the conditions that would enable learners to make best use of this opportunity. I argue that the learning community has to be seen as fundamentally an ethical one based on responsibility to the other and that this requires the opening up of conversations between learners and teachers for the sharing and negotiation of experiences and ways of working.

**Keywords:** community, discourse, identity, personal inquiry, presentation of self

### Introduction

This paper reports on a personal inquiry I undertook into the experience of networked learning through participating as a student in an online adult education course. My purpose was to pursue an intrinsic interest in the subject of the course and to provide myself with an experience through which I could begin to develop a grounded understanding of the networked learning process.

The purpose of this paper is to offer an insight into the networked learning experience through reflection on and inquiry into my own personal experience as a learner. My purpose is not to evaluate the course I experienced.

I first offer a brief overview of the design of the course I participated in, in order to contextualize my reflections for the reader. I follow this with an account of the approach I took to reflecting on and analyzing my experience. I then present three aspects of my learning experience which seemed to me



most significant. They are to do respectively with issues of identity, community, and the medium of written communication. I conclude the paper by drawing implications from these for our understanding of networked learning and for the pedagogical challenges it poses.

### **The course**

This was a ten-week online adult education course. It had no entry requirements except for the need to have access to relevant technology. It was taught by one tutor. Course administration and technological support were also offered. The course had its own Web-site which contained a welcome to the course, information about the timetable of work to be done and topics for discussion, background information on aspects of the course, postings on technological issues, and an evaluation questionnaire. Attached to each topic was the requirement for one of the participants to contribute a discussion paper. The main means of communication between the tutor and course participants was via asynchronous e-mail to the course e-mail address. There was also the opportunity for synchronous discussion. There was no formal assessment required but anyone who wished to do so could submit an essay for review by the tutor.

The course began through the process of receiving an e-mail from the course administrator welcoming participants and giving information about the tutor, how they would be contacting us and how to proceed. The tutor began by inviting all participants to introduce themselves. Only two or three introductions were made and very soon discussion focused on the first topic. The tutor made a couple of interventions during the course in order to request that we focus on particular questions. There was also some discussion as to what was required by the discussion papers. Although there was some discussion of questions raised by the tutor, no discussion papers were submitted.

Eleven people contributed e-mails at some time during the course. Five were regular participants.

### **Personal inquiry**

Broadly, two different approaches have been taken to researching the networked learning experience. 'Inside-out' approaches generate understanding grounded in the data (e.g., through case studies (Zenios, Banks & Moon, 2004); practitioner-researcher action research (Levy, 2004); or phenomenography (Houldsworth & Hodgson, 2002; Booth & Hultén, 2004; Roberts,

2004)). 'Outside-in' approaches apply theoretical and coding frameworks to the data (e.g., Chappel et al., 2002; De Laat & Lally, 2004). Lally (2002) is an example of work which seeks to triangulate data derived from both approaches. Personal inquiry involves the researcher in a conscious and critically reflective investigation into an area of the researcher's own experience. It could thus be argued to get the closest to the learners' subjective experience, i.e., researcher and learner have become one, and thus offers an 'inside-out' perspective. The process of personal inquiry is founded on the assumption that personal experience is a valid source of knowing and that critical reflection is an essential process in this coming to know. The understanding gained through such a process both informs the researcher's personal understanding and research purpose, and forms a framework within which to further investigate the issues raised outwith the realm of the personal (Marshall, 1999, 2001). The knowledge generated by such an approach could be described as 'really useful knowledge' (Barr, 1999) in that it tries to stay close to the experiencing subject and the context in which it arises.

A number of studies have recently been reported in the field of networked learning which adopt personal reflection on experience as a method of illuminating the networked learning process. These include Crosta (2002) on her own experience as a learner and Burge, Laroque & Boak (2000) on the tutor experience. Rheingold (1993) in his book on the experience of 'living' in a virtual community calls for the need for such personal perspectives in a field which, even now, is still so new.

The author's voice as a citizen and veteran of virtual community-building is one of the points of view presented in this book: I'm part of the story I'm describing, speaking as both native informant and as uncredentialed social scientist. Because of the paucity of first-person source material describing the way it feels to live in cyberspace, I believe it is valuable to include my perspective as participant as well as observer (Rheingold, 1993, p. 16).

The account I offer below arises out of a process of reflection on my experience and actions as a participant on this course. In order to help me with this process, I kept a learning diary of my experience during the course and subsequent to the course read through all the e-mails exchanged, noting what for me were any significant issues or experiences. This process can be likened to a stimulated recall process (see, e.g., Bloom, 1953), in which the e-mails we exchanged on the course and which I reread at a later date, stimulated my recall of the experience I had had and what seemed of significance to me. This approach has been adopted in numerous fields, including reading and writing research, nursing studies, classroom interaction research, teacher

thinking and second language learning. Lally (2002), investigating online learning experience, refers to a similar process as Critical Event Recall, which he bases on Kagan's Interpersonal Process Recall work which uses video recordings to stimulate informants' memory of their emotional experience of counseling processes.

Once I had reviewed the learning diary and the e-mails and identified key events or issues, I then tried to make sense of these by analyzing the dynamics that seemed to be in play that may have contributed to my experience. I then distilled what seemed to me to be the essence or 'nub' of the experience. I asked myself questions such as: What seems to be the nature of this experience? How can I describe it? Why did I feel like this? What seemed to be significant 'events' for me? Why?

I make no claims for objectivity or necessary generalizability from this process. I am not claiming that the account I give of my experience would be the same as that of other participants. What has been significant for me will have arisen out of my own particular context, previous experience and framework of assumptions. It will also likely be influenced by the particular unconscious dynamics I bring to bear to any engagement or experience. My purpose however is not to offer here an analysis of myself, so much as an analysis of my experience. I hope that any validity it may have will arise from what Eisner terms 'trans-subjective' validity, based on consensual validation. In other words, the account I offer below, whilst having personal validity in terms of my own experience, will only have 'trans-subjective' validity to the extent that you the reader can respond to it from your own experience. I offer this as an illumination of one online learner's experience and the possible insights this might bring. This approach is based on a view I have that in order to begin to understand and research a particular phenomenon, it is important for me to examine this from the inside-out and to gain some kind of an experiential understanding of it myself. In this way, I try to "keep close to the ground of one's various forms of knowing" (Marshall & Reason, 1997, p. 231).

## **The learning experience**

In this section, I present three areas which seemed to be particularly significant for me in my experience of networked learning. These were to do with my identity online and how I presented myself in the online environment; my experience of the emerging culture of the learning group and how I felt about engaging or not with others within it; and my experience of the written medium of communication itself.

*Identity: the presentation of self*

Contrary to my expectation that working online would allow far greater freedom of self-presentation, the paradox emerged for me of being more self-conscious online than face to face. There is a record of everything one says. One becomes visibly inscribed in the text. I was conscious of asking myself: How much do I disclose? How anonymous do I remain? My introduction of myself to the group shows how, in dropping the 'I', I seem to be expressing a certain shyness or diffidence about asserting my identity in the group.

Hello I'm Sarah – work at the Univ of Glasgow, am interested in NL so thought it would be useful to do a course as a student using the Internet to try to understand more about the process/experience.

I note in my diary that one of the participants has expressed concern about their educational experience and working class background. I become conscious of wishing to keep my professional self out of my self-presentation. I mostly send e-mails from work, and therefore take great care to delete my 'official' signature. One day I forget. Off it goes into the void. Will anyone comment, pick it up? Silence. It is a strange feeling – I've been found out, I've sent out more than I wanted to. Oh what the hell!

I am conscious of the idea of visibility and invisibility. All I have here are words on a screen and a sense of a void out there with unknown respondents. I have a strong feeling that I don't know who is out there. There is no instant 'feedback' and no capacity for instant re-adjustment of one's self in relation to others.

As the community develops, I become more conscious that there seem to be different values held by other members of the group. I am challenged by the question of how to express these values that seem to be different. I'm also not clear how different they really are. It requires great effort to express my views subtly in writing in this medium as opposed to the greater ease and fluency I experience communicating face to face. I am learning a new means of communication and I lose my day-to-day fluency.

It seems that the process of managing my identity as a learner entering and becoming part of this new learning community is exaggerated in the online learning environment. We know from the literature on learning groups (Heron, 1989, pp. 33–36) that any new group member is concerned with issues of whether one will be liked (acceptance anxiety), whether one will succeed and be able to perform (performance anxiety), and whether one will be able to understand (orientation anxiety). It seems to me that these 'anxieties' were exaggerated online rather than mitigated. The factors that seem to be at play here for me are to do with the invisibility of one's peers and teacher; the lack of or limited amount of feedback and clues as to who they are and

what they are making of me; the loss of speed, and concomitant increase in effort required to communicate in writing; and my sense of clumsiness and illiteracy in this new medium. It is as if learning to express myself and engage with others in a new medium highlights and exaggerates processes I normally take for granted.

*Establishing the learning group: the impact of early words*

Strongly connected to the previous section on issues around the presentation of myself online, are the issues that arose for me around the kind of learning group we were establishing and my participation in it. Most striking to me in re-reading my diary is a comment that I was disappointed that we didn't get under way on the date set, but when one of the first e-mails to appear from a participant suggested to me they were displeased that nothing had happened, I was immediately struck by the power of the word they used and the tone that it set for me. Although at one level it was obvious to me that the person was simply expressing their feelings, for me the impact was less one of gladness that there was a possibility for frank expression of feeling to emerge in the group, but more one of the possibility for negative judgments to be made and expressed about what was seen to be inappropriate behavior. Interestingly, then, from the start a word, for me at least, took on great significance.

Three other 'events' contributed to the sense of the development of what I experienced as an unstable learning environment. The first of these was the first contribution from the course tutor. Although it was obvious that the tutor cared, was very competent, made significant and very useful contributions, just one aspect of what the tutor wrote stood out for me and had an impact. This was expressed in a contradiction for me between a firm direction to participants to follow certain instructions on how to proceed and on what to focus, immediately followed by a comment that the tutor was there as a facilitator and we were to pursue whatever we wished. We did the latter, and never really engaged with the issue of negotiating how it might be best to work.

The second event was the realization that some of the participants had worked together previously on similar courses, and they also knew each other face to face and met regularly to discuss the course. As in all groups within groups this raised issues for me of inclusion and exclusion, and of power associated with alliances and privileged knowledge. This experience was reinforced when it became clear that the course tutor had worked with this group before.

The third event was the first substantive contribution commenting on the first topic. This contribution expressed strongly a view that was very contrary to my own. It was also expressed in what to me was language whose tone

I found troubling and slightly alienating. Subsequent contributions seemed to appreciate the robustness of the contribution and in essence supported the views expressed. I began to question whether I was the only one who thought differently. And if this was the case, how well did I and would I continue to fit into this group. For a while this led to my taking a more withdrawn position until I began to feel rebellious. It was as if for me the discourse space had been hijacked. Eventually I contributed an alternative point of view. Others also did so. The person who made the original contribution apologized and feared they had acted inappropriately. I began to fear that it was my very response which had had a negative effect on the contrary view. I now felt positioned as the one who had complained at the nature of the first contribution, when what I had done is assert an alternative and wanted to engage with that. But I was left wondering whether my motives were as innocent as I might have asserted.

The final point I wish to make about the experience of the learning group is that it never really felt to me as if we had one. There was a core of about five people plus the tutor who regularly contributed and other than that there were appearances once or twice from another five or six. New people seemed to pop up out of the blue; others who contributed once at the beginning never appeared again.

In reviewing this aspect of my experience I am struck by the power of the signal of the word and how this is interpreted by me on the basis of a considerable assumptive process. One could liken this process of engagement in the forming of the learning group as a mythopoeic one (Adams, 2001), one which allows fantasy and the imagination greater play, especially concerning the physical form and feel of the other person and the norms and values they hold and therefore the judgments they make. I have images of my fellow participants in my mind, rather as in a radio play, but no concrete physical experience of them, except through words. I can only imagine. Nakamura (1995) describes this mythopoeic quality as 'the architecture of belief informs social interaction online'.

### *The weight of words: reading and writing online text*

Significantly linked to the previous point, and probably to the whole experience, is the experience I had of the ponderous, heavy nature of communicating in this way, with only the written word to express ourselves. The demands of reading and responding through writing seem far greater than those of immediate face-to-face response where so much more can be taken for granted and signaled through context and body language. This experience is exaggerated by the context of my participation, one of heavy workload and frustration with aspects of the technology. My work also requires me to read and write a lot. Evening classes have in my past experience been a relief from

this, a bit of social and educational fun. Translating this experience online was for me a demanding experience. It required discipline and effort, the antithesis of what I wanted!

The theoretical exploration below suggests why this process may be such a burden and how it relates to identity work and group forming.

### **Discussion: implications for an understanding of networked learning**

One can argue that language use in networked learning involves a combination of speech utterance, letter-writing (Collot & Belmore, 1996) and formal written text. It might also have something of the nature of classroom discourse about it. Although Benigno and Trentin (2000) have recently argued that computer conferencing messages cannot be analyzed in the same way as other language forms, they do not offer an investigation of the nature of online discourse itself. The exploration I offer below seeks to offer some insight into what the nature of this discourse might be and how this impacts on the presentation of self. What was significant in my experience of communicating in a networked learning environment, was trying to engage with others through written communication as if I was in a face-to-face conversation or dialog. I therefore focus the following analysis on how what we know about face-to-face communication through discourse and conversational analysis may be altered in the online discourse environment.

Stubbs (1983, p. 3) defines language use, according to Malinowski, as *action in context*. In this view, language, action and knowledge are inseparable, as are language and situation. That is, how we use language is inextricably bound to our knowledge and frameworks of assumption and when we use language we can't help but act and construct reality and understanding through it. What we express has significance. And this use of language is inextricably bound to how we define the particular social and linguistic situation in which we are. However, language is also highly implicit and indirect, and is dependent for its 'fluency', on actors' knowledge and assumptions, and on their interpretive, expressive and negotiation capabilities. According to Stubbs, "the basic problem for discourse analysis is how speakers can say one thing and mean another" (Stubbs, 1983, p. 5).

The interpretive processes necessary for dealing with this implicit and indirect aspect of language is referred to as *conversational inference* by Gumperz (1982, p. 153). He describes conversational inference as "the situated or context-bound process of interpretation, by means of which participants in an exchange assess others' intentions", and on which they base their responses. According to Gumperz, conversations are sustained through the bringing to bear of shared linguistic and socio-cultural knowledge through

processes of inference based on *indexical signs* or *contextualizing cues* within the discourse of the interlocutors. These signs, for example dialect, rhythm, lexical choice etc., are intentional and therefore meaningful, symbolizing markers of context and convention, and are thus central to the shared construction of reality. They have interpretive significance. There is however always the potential for misunderstanding given the implicit nature of the inferential and cuing processes. And this therefore requires the need for what Gumperz terms *conversational management* (Gumperz, 1982, p. 159):

It is through talking that one establishes the conditions that make an intended interpretation possible. Thus to end a conversation, one must prepare the ground for an ending; otherwise, the ending is likely to be misunderstood.

In an online learning environment the same language processes will be taking place, except that the indexical signs or contextualizing cues normally available in spoken discourse have been limited by the written discourse processes required. Furthermore, given the implicit nature of language described above, the possibility for misunderstanding is greater and therefore the work required for 'conversational management' to mitigate this is even higher in this new environment. First meetings, early presentations of self, negotiations of learning community norms, and responses to contributors all have the potential for greater misunderstanding, all therefore become more significant and require greater effort to manage. No wonder then, that the weight of the words is felt so keenly. A whole new communication process has to be learned. It is not simply a process of shifting from speaking and listening to reading and writing.

Goffman (1971) argues that identity and self-presentation are managed through the consciously used medium of language (the expression that s/he gives) and through the more theatrical and contextual medium of non-verbal gesture, conduct and appearance (the expression that s/he gives off). The individual is able to manage both of these to create a particular effect, just as those meeting the individual will use both of these media in order to make judgments and inferences about the trustworthiness and 'authenticity' of this person. According to Goffman, we will use what may in some cases be the less voluntary and controllable medium of gesture and non-verbal communication as the source of evidence against which to check the more controllable presentation of self through language. Although it is possible to critique Goffman's analysis in the way that it seems to separate language and action, nevertheless it offers an interesting further insight into what may be happening in the online learning environment.<sup>1</sup>

According to this perspective, both the presenter of self and the 'receivers' of this presentation of self have lost a highly significant source of information



(or in Gumperz's terms, indexical sign). They have lost or got a much reduced expression of the non-verbal. An example, from my own experience, is my formal presentation of self through a written introduction (the expression that I give) as opposed to my presentation of self through the 'non-verbal' of both the tone of subsequent contributions but also the 'slip' of inadvertently letting out my official signature (the expression that I give turned into an expression that I give off).

Two effects are produced by this. Firstly, as in the discussion above, greater effort is required for identity work online in order to compensate for the loss of this significant non-verbal medium. Secondly, according to Goffman, one of the main reasons we attach such importance to identity work, is that we need to establish the 'trustworthiness' or not of our interlocutors – who they are – in order that we can work out what kind of communicative context we are in and therefore what norms or 'rules' of behavior and interaction are to apply. If this process is disturbed, as it may well be online, then the consequences are likely to be a greater sense of uncertainty and instability attached to establishing the norms of the particular community and how it is most appropriate to act within it. This was certainly my experience.

Another element that may have contributed to this experience of instability in the learning community is the fact that it remained at all times a community without clear boundaries. That is, except for the contributions of regular participants and the tutor, it was never really clear who else was in the community. This had a paradoxical effect – on the one hand it suggested a certain freedom and openness; on the other hand, like an open door in a draft, it provoked a feeling of unease.

Derrida does not like the word 'community'. He is concerned by its potential for closure, identification with itself and its association with the idea of fortification (Caputo, 1997). In other words, he argues that the idea of community (a concept which carries within it notions of belonging, solidarity, identity) cannot help but also include ideas of exclusion, that is, of those who do not belong. According to Derrida, a community can never be fully inclusive; it must always have insiders and outsiders. Holding to the importance of community and the boundaries thus erected between those who belong and those who don't, closes off the possibility for future '*in-vention*', for openness to the other. It denies the fundamental assumption behind Derrida's position on deconstruction that one's stance should not be one of seeking autonomy but one of having responsibility to the other and being open to the potential of what is not yet (Caputo, 1997, pp. 106–109).

My experience of classrooms is of relatively bounded spaces. I am disturbed if people come and go and we can't settle. As a new member of a learning group I am tending toward a need for community in the sense of a

bounded space in which certain purposes and norms are shared. This may help me to contribute and engage more easily. The online learning group I experienced is a less bounded space, which has not explicitly established a common purpose and which has certainly not established agreed norms and values. In many ways it could be an example of a future *in-vention* of community, the opportunity for experience and expression of diversity and for the stance of responsibility to the other. In this case, this potential was not realized, for in my mind I was still learning the ropes afforded by this new medium, was still translating it out of my previous experience, rather than experiencing it in its generative newness.

This analysis of my experience as a networked learner and this brief exploration of some relevant theoretical concepts suggest to me that Networked Learning does involve radically new discourse practices. Merchant (2001), in a study of teenagers' use of digital technology, concludes not only that linguistic innovation seems to be arising out of these new contexts of communication, but that teenagers are 'in the vanguard of these processes of change as they fluently exploit the possibilities of digital technology' (p. 293). In contrast, the newness of this discursive environment to a middle-aged person such as myself, the natural uncertainty generated by learning itself and the negotiation of membership of a new discourse community, in my view, may have compounded the weight of the words, clunky and burdensome, and promoted a tendency toward the need for a more conservative idea of a stable community.

### **Conclusion: the pedagogical challenges of networked learning**

The following pedagogical challenges are posed by this reflection on networked learning:

- The need to facilitate the presentation of learner and teacher identities in such a way that takes account of the loss of the normal channel of the non-verbal and theatrical referred to by Goffman and which attempts to design into the networked learning environment ways in which this can be compensated for.
- The need to make explicit the development of operating norms and conventions for guiding the discursive practices of the learning group.
- The need to support alternative forms of indexical signs or contextualizing cues in such a way that is appropriate to the new medium of communication and the educational purpose of the course, and in such a way that lightens the burden of the weight of words on teacher and student alike.

- The need to take account of the fact that in the new discourse environment with its reduced communicative media there is the potential for greater misunderstanding and for significance to be given to what may seem entirely insignificant.
- The need to take account of the fact that for some learners engaging for the first time in networked learning requires the learning of new literacy practices.
- The need to consider ways in which the developing learning community can be open to the other of uncertainty, ambiguity and difference whilst at the same time holding the boundaries of the learning space.

At first glance these pedagogical challenges suggest a need to address issues of 'how to' – how to lighten the weight of words, compensate for the loss of indexical cues and the expression 'given off', establish norms, deal with misunderstandings, and create openness in boundedness. As if it were possible to somehow resolve these issues once and for all and make them disappear, prior to the initiation of a new learning community. An alternative view is that such challenges, and many such others, will always arise in the learning space. What is needed is the possibility to address these as they arise, and in engaging with them within each unique learning group, to find ways toward mitigating their inhibitory and potentially alienating effect.

It could be argued that my experience of online learning was the result of a failure of community. In Mann (2001) I argue for the educational process of the learning community to be seen as fundamentally an ethical one in which teachers and learners have to develop a stance of openness to the Other – the Other of the teacher, learners, the subject of study itself. Such an openness to the Other requires one not to reduce the difference of the Other to the known of oneself, and to give up one's need to establish one's own autonomy. It is obvious from the reflection on my learning experience online that I did not do this. I was too caught up in my own concerns to take much responsibility for the Other. I was not explicitly engaged in working to establish a sense of community in which both I and the difference of the Others could reside productively. Rather I was engaged in finding my place in an imagined community and in finding a voice to express my thoughts on the subject of study. One could argue that although this self-concern is initially the learner's privilege, this has to change for the community to work. It is the teacher's responsibility to enable this change.

I argue that this requires five responses (Mann, 2001) – the offering of hospitality and safety; the expression of solidarity; the sharing of power; and attention to criticality. In other words, the teacher has to pay attention to, and help other members of the learning group pay attention to: the provision of hospitality and welcome; the negotiation of safety; the telling of stories of

experience, allowing the group to empathize and identify with each other's differences and shared humanity; the addressing of power and its workings in the group; and the application of criticality through reflection and discussion on both the processes of the group and the subject of study. This requires the opening up of conversations between learners and teachers for the sharing and negotiation of ways of working and experiences, whilst keeping at bay the community's urge to consensus and homogeneity, so criticized by Derrida.

In many ways, what I am arguing for resonates with Hodgson and Reynolds's (2002) proposal for a 'pedagogy of difference' in which multiple and shifting learning communities are valued over unitary and fixed ones. It seems to me that both positions are based on an ethics of responsibility to the Other.

## Note

1. A number of studies of electronic communication have used Goffman's concept of the 'presentation of self. Some of these include Giese (1997) investigating the ways in which people use the new environment of virtual communities based on textual communication to find novel ways of presenting themselves; and Walker (2000), and Miller and Arnold (2001) who investigate women's presentation of self through home pages.

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## Chapter 10

### Teaching using the Web: Conceptions and approaches from a phenomenographic perspective

GILLIAN ROBERTS

**Abstract.** Research undertaken in 2000–2001 in one modern Scottish university shows that most current university teachers' conceptions of and approaches to using the Web for learning and teaching are far removed from the concept of 'networked learning'. The argument is made that university teachers' preferred approaches to teaching and learning are informed by their conceptions of teaching and learning. If approaches to using the Web are to move closer to definitions of networked learning, teachers' conceptions need to develop from instructivist, information transmission mode to constructivist, learning facilitation mode. The role of experience and contextual factors are discussed in achieving the development of conceptions and networked learning.

**Keywords:** approaches to teaching, conceptions of teaching, networked learning, phenomenography, teaching using the Web

#### Introduction

I argue that the concept of networked learning, as defined in the Introduction to this volume, is far removed from most current university teachers' conceptions of and approaches to using the Web for learning and teaching. Further, I argue that for it to become widely-adopted requires that university teachers' conceptions of teaching in general and using the Web in particular, need to become aligned with this definition. This paper reports key findings from a larger study undertaken in a modern (post 1992) Scottish university (MSU) in 2000–2001 and discusses these in the context of the definition of networked learning and the implications that arise for pedagogy and practice in terms of conceptions of, and approaches to teaching and learning.

Networked learning is regarded by leading researchers in this field (Harasim et al., 1997; McConnell, 2000; Goodyear, 2001; Salmon, 2000; Steeples & Jones, 2002) as the most effective way to develop use of the Web for learning and teaching. If this is accepted, then the implications for pedagogy and practice are that this view is already widely shared and practiced in higher education, or that it needs to be, if widespread uptake and effective development and use of the Web is to be realized.

Networked learning suggests an integration of a range of activities, i.e., teaching and learning mainly involving electronic media but also other formats such as face-to-face teaching and learning. The definition emphasizes collaborative and co-operative learning but also implies that there is some scope for individual and independent learning. Finally, the definition refers to interaction with online resources, with an implication of collaborative knowledge production. The concept of connectivity – between learners, with tutor(s) and with online resources – underpins this definition, while the underlying rationale is that,

people learn best when they have the opportunity to work with other people through processes of cooperation and collaboration (McConnell, 2000, p. 1).

The theoretical frameworks used to analyze the data generated in this study drew mainly on Kember and Kwan's (2000) teachers' conceptions of, and approaches to, teaching and Mayes and Fowlers' (1999) learning cycle. Results show that while there is some evidence of networked learning, the dominant conception of using the Web for teaching is for information transmission and that approaches to use are still limited and fragmented.

## Theoretical background

### *The nature of conceptions (of learning and teaching)*

Conceptions are specific meanings attached to phenomena, which then mediate our response to situations involving those phenomena. We form conceptions of virtually every aspect of our perceived world, and in so doing, use those abstract representations to delimit something from, and relate it to, other aspects of our world. In effect, we view the world through the lenses of our conceptions, interpreting and acting in accordance with our understanding of the world (Pratt, 1992, p. 204).

The value of research into conceptions is that it allows for classification beyond procedures or behaviors where the permutations are numerous. A few conceptions may underlie and explain many different behaviors.

Developments within the phenomenographic research tradition led Marton, Dall'Alba and Beaty (1993) to provide a detailed exposition of *conceptions of learning* but others have investigated conceptions of *teaching* (e.g., Trigwell, Prosser & Taylor, 1994; Martin et al., 2000).



### *The nature of approaches (to learning and teaching)*

Approaches have been characterized as comprising *motive* and *strategy* dimensions (Biggs, 1989; Trigwell, Prosser & Taylor, 1994; Trigwell & Prosser, 1996; Kember & Kwan, 2000; Martin et al., 2000). In these studies, approaches have been identified as either,

- (a) *content-centered* approaches (i.e., the intention being to transfer information or concepts to students by *teacher-focused* strategies) or
- (b) *student-focused* or *learning-centered* approaches (with the intention of helping students develop or change their understanding of key ideas).

In allocating lecturers to categories of approaches, Kember and Kwan (2000) found most teachers could be classed as taking either a content-centered or a learning-centered approach. However, there were others where the distinctions were not so clear – hence the view of continua of approaches and dimensions. Cross tabulations of their results on teachers' conceptions and teachers' approaches showed a very high level of correspondence. On the basis of this evidence, Kember and Kwan (2000) claim a strong relationship between teachers' conceptions of and approaches to teaching has been established. They proceed to question whether teaching approaches, like students' approaches to study, are context dependent – Kember and Kwan (2000) suggest lecturers' approaches to teaching are likely to be preferred but also context dependent, or relational. They explain that given a free choice lecturers are likely to choose methods which are consistent with their deeply held conceptions of teaching but other factors may impinge which require teachers to adopt approaches which move away from their conceptions, e.g., institutional or departmental influences, curriculum design or student presage factors. For some teachers, contextual factors have been found to be barriers to using the Web for learning and teaching (Haywood et al., 2000).

### *Networked learning*

McConnell (2000) supports the development of networked learning with its emphasis on learning and not on technology and claims, "*we are experiencing a paradigm shift in our thinking about learning*" (p. 188). He continues "*learning how to work with the technology and take advantage of the networking in learning are the key issues*" (p. 189).

Harasim et al. (1997) describe the effective use of learning networks for teaching and learning comprising a sequential process beginning with online socialization, leading to the sharing of information, then proceeding to engagement in group problem solving activities which in turn lead to shared knowledge building. The emphasis is on the learner, with the tutor undertaking a facilitative role in enabling learners to achieve and progress through

these stages. The fundamental principles underlying networked learning are student-centeredness, that learning is outcome-focused and that it requires active participation, group collaboration and the formation of learning communities. This is developed further and made more explicit by Salmon (2000) in a five-step hierarchical model of online learning and teaching, beginning with access and motivation and moving on to online socialization, information giving and receiving, knowledge construction, and development as an autonomous learner.

McConnell (2000, p. 26) argues that cooperative learning

helps clarify ideas and concepts through discussion, develops critical thinking, provides opportunities for learners to share information and ideas, develops communication skills, provides a context where the learners can take control of their own learning in a social context, provides validation of individuals' ideas and ways of thinking through conversation (verbalizing); multiple perspectives (cognitive restructuring); and argument (conceptual conflict resolution).

The issue for teachers' conceptions would appear to be whether co-operative learning as described could be undertaken mainly through online communication, as the definition of networked learning implies.

Goodyear (2002), in undertaking detailed analysis of the work of one online teacher, aimed to characterize and compare online teaching with more traditional face-to-face teaching approaches. In doing this, six key areas of teacher's knowledge and beliefs emerged, namely: focus of attention, knowledge of student, articulation of pedagogical beliefs, handling tensions, presentation of self and routine versus deliberate action. This suggests that staff development may be an issue to become effective in an online learning and teaching context.

### *Conceptions of and approaches to teaching and learning using the Web*

The Web can be used to create and share learning resources and to enable communication between students and with tutors. The key is that it is *how* the Web is used that will reflect either a subject-content or student-centered conception of, and approach to, teaching.

Mayes and Fowler (1999) developed a three-stage model – or learning cycle – consisting of conceptualization, construction and dialog, where,

- *conceptualization* is the process of interaction between the learner's pre-existing knowledge structures and new information
- *construction* is the application and testing of new or refined conceptualizations through the performance of meaningful tasks and,

- *dialog* is the creation and testing of new conceptualizations during interaction with tutors and fellow students as well as through personal reflection.

Mayes and Fowler (1999) further characterized the types of communication and information technologies (C&ITs) used to achieve each stage of his learning cycle as primary, secondary or tertiary courseware (see Figure 1).

Given that the Web can be used as a medium for integrating and accessing a range of different C&ITs, Mayes and Fowlers' model has been adapted to categorize uses of the Web – as shown in Figure 1 – and is used as a framework to interpret and present my survey results. The practical implications of applying Mayes and Fowlers' learning cycle to teaching in higher education are that staff will accept and develop a constructivist, dialog-based approach to teaching and learning, indicative of the '*learning or capability paradigm*', and will move away from the '*instructionist, knowledge-based paradigm*'. In terms of using the Web this requires that staff acquire a fluency in the use of the Web for learning and teaching. And perhaps more importantly, that they acquire an understanding of the pedagogical underpinnings of this new approach and commit themselves as teachers to becoming the '*facilitators of understanding*' rather than the '*purveyors of knowledge*'.

This implies a rejection of the pedagogical conception of teaching based solely on the presentation of knowledge in favor of one which supports the self-paced individual learner as well as enabling collaboration, co-operation and the co-production of knowledge. Stimulating dialog between students; between students and tutor and dialog internal to the learner helps develop skills in reflection – an essential part of learning how to learn and requiring teachers to demonstrate the characteristics and processes identified by Harasim et al. (1997), McConnell (2000), Salmon (2000) and Goodyear (2002).

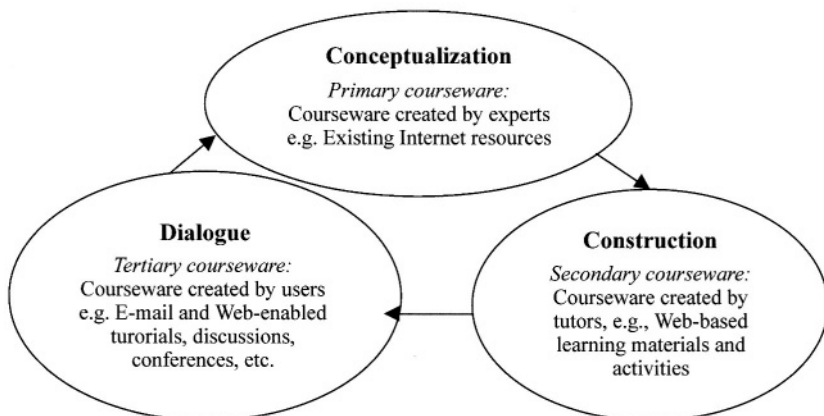


Figure 1. Adaptation of Mayes and Fowlers' learning cycle (1999) categorizing Web uses.

## Methodology

### *A mixed methodology*

A mixed methodology was used for this study. Firstly, a Web-based survey was undertaken to identify the extent and nature of Web use for teaching and learning in MSU. This was followed by 17 in-depth interviews to get closer to the experiences and beliefs of individual staff. Through interpretation and analysis of descriptions of their experiences the aim was to offer insight, enhance understanding and provide a meaningful guide to university teachers' conceptions of, and approaches to, teaching using the Web.

### *Research questions*

Specific research questions addressed in this paper are:

- What *approaches* to teaching using the Web, are to be found in this sample of teachers?
- What *conceptions* of teaching, using the Web can be found?
- To what extent do individual university teacher's *conceptions of, and approaches to*, teaching using the Web align with the definition of *networked learning* underpinning the articles in this collection?

### *Methodological background*

My stance is interpretative and within this I am taking a phenomenographic approach. Phenomenography offers an alternative research approach for understanding teaching by focusing on the ways teachers are aware of, or experience, their world (Marton, Dall'Alba & Beaty, 1993; Booth & Hultén, 2004). I am relying on self reports and descriptions of experiences, beliefs and behaviors as legitimate sources of data, given the intangible nature of the phenomena under investigation and my own beliefs concerning the nature of knowledge, how it is constituted and how it can be known. I am aware that in this process my presence as researcher influences how and what interviewees say and that in my interpretation of what they say I am continually making judgments as to what is significant – influenced by my beliefs, background and experience and acknowledging the theory-laden character of research (Gill & Johnston, 1991). Through careful description of my research process, and reflexivity in reporting, I aim to demonstrate the validity of my findings in the eyes of other researchers and readers.

### *Survey*

The survey aimed to establish a baseline of current approaches to using C&ITs for teaching, though the findings presented here only concern uses of the Web. The URL of a short, Web-based questionnaire was e-mailed to all teaching staff in the university. In addition paper copies were distributed to any staff that might prefer to respond on paper. The questionnaire was anonymous unless staff chose to self identify by agreeing to take part in follow up interviews or requesting a copy of survey results. The survey period was two weeks in early 2000. 256 responses were received, 250 of which were submitted electronically on the Web. Of these, 150 responses were received within the first two days of the e-mail being sent.

### *Response rate, sample and method of analysis*

The survey was intended to reach all teachers in MSU and it is likely that this was achieved. A self-selecting sample responded (32%). This carries with it the potential for respondent bias. For the purposes of analysis, data are treated as from a non-probability sample. Comparisons made on gender, age and faculty origins showed the sample was representative of the overall population of MSU, and the higher education sector in general. Responses were analyzed using SPSS. All open-ended questions were post-coded for quantitative analysis in SPSS but were also qualitatively analyzed. The survey produced mostly nominal data. Given this, and the self-selecting nature of the sample, analysis was limited to descriptive statistics, with chi-square tests for significance undertaken where appropriate.

### *Interviews*

The sampling strategy for the interview with teachers was purposive, with teaching *beliefs and experiences concerning the use of Web for teaching and learning* guiding selection of teaching staff. Another aim of the purposive sampling strategy was to include teachers of different status, age, gender, disciplinary background, and with different areas or levels of responsibility and lengths of teaching experience. No attempt was made to fix the total numbers of interviewees. Instead I was guided by my desire to get as broad a range of experiences as was possible and while it might always be preferable to get a larger rather than smaller sample, I was also influenced by the similar scale of research undertaken by many previous researchers undertaking similar work on teachers' conceptions and approaches to teaching (Trigwell, Prosser & Taylor, 1994; Martin et al., 2000; Kember, 1997). Each interview took about an hour and was tape-recorded for transcription. They were free flowing discussions rather than highly structured interviews. To prompt discussion and

provide context, interviewees were invited to focus on one of the modules they teach and describe to me how they undertook teaching on that module.

### *Processes of analysis*

Murray and Macdonald (1997) claim the important characteristics of narrative accounts are that they are detailed, contextualized and personal, so reading and listening to my interviewee accounts served the purpose of making me more familiar with each of the 17 interview transcripts as I effectively relived the interview experience. From this, seven teachers' transcripts, which from the literature represented the full range of conceptions of teaching, were selected for detailed analysis and became my data set. Kember and Kwan (2000) suggest *conceptions* are generic, deeply held and unlikely to be influenced by context. *Approaches* to teaching are more likely to be influenced and changed by contextual factors. Using Kember and Kwan's (2000) model as the organizing framework, I constructed a template of five subheadings under which I could categorize my data,

- 1) presage factors (teacher information, personal factors and experience)
- 2) context factors (institutional, student and subject factors)
- 3) conceptions of teaching (defined as expressed beliefs)
- 4) approaches to teaching (descriptions of how teaching was undertaken)
- 5) conceptions of and approaches to using the Web for teaching and learning (descriptions of expressed beliefs concerning using the Web for teaching and descriptions of how teaching using the Web was undertaken).

Strauss and Corbin (1996) write about this as a coding process or set of procedures that researchers use to interpret and organize data that usually involves

conceptualizing and reducing data, elaborating categories in terms of their properties and dimensions (p. 12).

I used the template described above for every transcript, '*conceptualizing and reducing*' my data, and Atlas Ti to code sections of data. The advantage of computer-based qualitative data analysis is that it does manage data and enable cross sectional exploration. 'Families' were created of all coded quotations, e.g., conceptions of teaching, approaches to teaching, conceptions of using the Web for teaching and approaches to using the Web for teaching. I was thus able to return to my interviewees' own words and descriptions under my codes and families. Here, I used the 'constant comparative method' drawn from grounded theory (Glaser & Strauss, 1967), which, as its name implies, allowed me to make comparisons within and between descriptions, codes, families and cases. The emphasis of this approach was on the formulation of theory through constant and multiple comparisons. This is similar to

the approaches undertaken by Samuelowicz and Bain (1992), Samuelowicz and Bain (2001), Marton, Dall'Alba and Beaty (1993), Trigwell, Prosser and Taylor (1994), Kember and Kwan (2000) and Martin et al. (2000) in their research on conceptions of learning and teaching.

## Survey results – approaches to teaching using the Web

### *Using the Web for conceptualization*

The first stage of Mayes and Fowler (1999) learning cycle is described as 'conceptualization' – that is, the process of interaction between the learner's pre-existing knowledge structures and new information. In terms of the respondents in this survey, the Web was the most frequently used of all C&ITs with a large majority of respondents (86%) having accessed it for resources to support their teaching and/or student learning.

The most frequent reason given for use is to enable staff to keep informed and up-to-date (49%) in their subject area and then to direct students toward relevant information (30%) (see Table 1). Most uses of the Web were consistent with Mayes and Fowler (1999) descriptions of primary courseware – enabling the 'conceptualization' stage in his learning cycle, where both tutors and students can be considered as learners. There were extremes in confidence and ease of use of the Web among respondents ranging from those who felt they couldn't do without it now to those whose experience was described as '*hit and miss*'. Familiarity and comfort with the Web is still an issue for some teachers.

*Table 1. How respondents used the Web*

	Frequency	Percent
Inform teaching, keep up to date	144	49
Direct students to useful sites	87	30
Construct learning activities around Internet resources	44	15
Teach how to use Internet	10	3
Research/personal development	8	3
Total*	293	100

\*Total = multiple responses

*Using the Web for construction*

While widespread use was made of the Web, far fewer staff (26%) had their own materials on the Web. Among these, no significant demographic patterns of use were evident. Analysis of descriptions of these staff resources put onto the Web showed that most comprised module handbooks, additional resources and reading lists with only 18 teachers (7%) using the Web interactively, e.g., for students' interactive exercises (5%) or for communication or discussion with students (2%). The latter uses were mainly by teachers who were teaching students off-campus. Most teachers did not appear to be making use of the Web to meet the '*construction*' stage of Mayes and Fowlers' learning cycle. The creation of Web pages and provision of Web-based materials is useful to support teaching and learning but does not contribute to the construction stage of the learning cycle unless designed to be used in an interactive way by learners undertaking, individually or collectively, some form of learning task.

Using the Web only as a source of subject information may be indicative of a lack of pedagogical knowledge of how else to use the Web, or a lack of technical knowledge of how to create interactive exercises on the Web. It may be due to a perceived absence of need to use the Web in this way where the majority of students are campus-based. Or it may be that the teachers concerned here have not (yet) developed an understanding of how existing Web resources could be used interactively to enhance the teaching and learning experience of campus-based students.

*Using the Web for dialog*

The final stage of Mayes and Fowlers' learning cycle is described as concerning '*dialog*'. This involves the creation and testing of new conceptualizations through conversations with tutors and fellow students, as well as through personal reflection. In face-to-face situations this is undertaken formally in seminars or tutorials and more informally in students' group work, for example. In terms of the Web this can be undertaken via e-mail, video conferencing or by use of Web-based discussion groups. All academic staff in MSU have access to e-mail and the Web. However, it was not until the 1999/2000 academic session that *all* students were issued with an e-mail account. There is no university directory of all students' e-mail addresses (as there is of staff e-mail addresses). Therefore, it was not straightforward for academic staff to communicate with individual students or groups of students via e-mail and so use of e-mail by teachers was often reactive, replying to e-mails initiated by students. Despite this, the majority of staff (69%) did use e-mail with students. Of these, communicating about course/administrative arrangements



Table 2. How respondents used e-mail

	Frequency*	Percent**
Arrange meetings, answer queries, make announcements etc.	94	36.7
Coursework submission or feedback	70	27.3
Issue course materials	37	14.4
Provide distributed learner support	34	13.2
Discussions	16	6.2
Feelings expressed	14	5.4
Use integrated into module	5	1.9
Total number of sample giving comments	160	62.5
Total in sample	256	100

\* More than one response given by many respondents

\*\* Percent of total sample giving each response category

was most common (62%). Use for learning and teaching comprised 34%. The two most common examples of e-mail use concerned routine administrative matters, and communication and feedback on coursework, in particular on students' dissertations (see Table 2).

While there was very little use of video conferencing (6%) it was being used for collaborative learning with distributed groups of students as well as for subject content transmission via guest lectures. Its limited availability at this stage meant that its uses were mainly for funded pilot projects.

There was very little evidence of tertiary courseware use, in the way envisaged and defined by Mayes and Fowler, in this survey. These technologies and especially e-mail are being used mainly for purposes which are *supportive* of teaching, rather than directly *in* teaching. The third, 'dialog', stage of Mayes and Fowlers' learning cycle appears to happen in face-to-face teaching, with little use of the Web to fulfill this role at present.

#### *Evidence of networked learning from this survey*

In terms of approaches to teaching using the Web, the evidence here suggests that most academic staff have limited experience of using the Web for teaching and learning. Where it is being used, most uses are for transmission of subject content information and materials, the conceptualization stage of Mayes and Fowlers' learning cycle. There is evidence of some use for the construction and dialog stages of Mayes and Fowlers' learning cycle. In terms of attributed conceptions, it would appear that most academic staff responding in this survey have conceptions of the Web as a medium for information

Table 3. Using the Web

Web uses	% use
Internet resources	86
E-mail	69
Own Web-based materials	26
Video conferencing	6

transmission and support and their uses of the Web are still far removed from the definition of networked learning.

### **Interviews results – conceptions of, and approaches to, teaching using the Web**

#### *Conceptions of teaching*

Analysis of the transcripts of interviews with teachers shows clear evidence of the two main orientations to teaching. The teachers can be categorized as having teacher-centered/subject-focused or student-centered/learning-focused conceptions of teaching. Further, within each orientation, there is evidence of differences in emphasis suggesting a range of positions within each orientation. This is summarized in Table 4.

The evidence here is consistent with established models of conceptions of teaching. I have given examples that suggest further subdivisions within each of these orientations, though as Kember (1997) indicated, the boundaries between these subdivisions are blurred. This is consistent with previous research and may serve to validate my findings.

#### *Teacher-centered/subject-focused conceptions of teaching*

Table 4 shows that John and Walter have been identified as having conceptions of teaching within the teacher-centered/subject-focused orientation. When it comes to using the Web for teaching, Walter is an advocate while John is a minimal user. Despite this, their uses of the Web appear to be consistent with their teaching orientation. John makes use of the Internet for subject information. He describes his use of the Web as being to '*make a point ... illustrate ... elaborate ... but that's all it's there to do*' in his lectures or presentations. He does use e-mail to supervise dissertation students but curiously does not see this activity as being 'teaching'. His approach to

Table 4. The experiences of seven teachers

Teacher: subject area	Orientation to teaching	Conception of teaching	Disposition to using Web for teaching	Approaches to using Web for teaching	Conceptions of using Web for teaching
Walter: <i>Economics</i>	Teacher-centered, subject focus	Imparting information	User and advocate	Transmitting structured information/ tutor–student interaction	Tutor–student interaction (Tutor – led, student directing)
John: <i>Retail marketing</i>		Transmitting structured information	Minimal user and skeptic	Transmitting structured information	Inanimate object subject focus (entertainment vs analysis)
Betty: <i>Hospitality management</i>		Tutor–student interaction, student directing, apprenticeship	Non-user – technophobia	NA	Tutor–student interaction
Bill: <i>Management</i>	Student-centered learning focused	Learning facilitation	User – enthusiastic pioneer	Learning facilitation	Learning facilitation
Joan: <i>Human resource management</i>		Intellectual development	User – reluctant pioneer	Learning facilitation/ intellectual development	Learning facilitation/ intellectual development
Andrew: <i>Economics</i>		Conceptual change	Non-user – but advocate	Subject focus, imparting information	Learning facilitation
Eddie: <i>Management</i>		Conceptual change	User – enthusiastic pioneer	Intellectual development	Intellectual development

teaching using the Web appears to be consistent with an ‘imparting structured information’ conception of teaching.

Walter is an experienced user of the Web and has technical computing expertise. Walter makes no mention of using e-mail for teaching and learning. He does provide Web-based module information and subject resources for students to access. All of this may be consistent with the ‘imparting information’ teaching conception. Walter’s use is firmly focused on the subject and on helping students acquire knowledge and understanding of a predefined body of subject knowledge. However, his technical expertise has allowed him to develop and use secondary courseware in addition to primary courseware. This

use is consistent with Mayes and Fowlers' construction stage in the learning cycle and perhaps more indicative of a 'teacher-student interaction' conception of teaching. Walter's motivation for using the Web appears to be to enable students to test and develop their understanding of subject concepts through construction type activities as well as conceptualization through provision of subject information. Convenience and resource efficiencies also appear to be important motives. His strategies for use are to support his teaching and encourage independent use by students. In this latter context his motivation is to save his time in marking, giving individual feedback and providing subject information.

### *Student-centered/learning-focused conceptions of teaching*

In Table 4, Bill, Joan, Andrew and Eddie were all identified as having conceptions of teaching within this orientation.

Bill is an enthusiast for the use of the Web for teaching and learning. He has several years of varied experience. He makes use of all categories of courseware to transmit module and subject information, for students to undertake interactive exercises and for students to engage in dialog, where he also contributes and provides feedback to students. He also uses the Web to enhance the learning of students on placement by making explicit links between his teaching and the external world where students are working. Bill's experience has been with smaller numbers of off-campus students. His motivation for using the Web has been influenced by the needs and opportunities created by these student groups. His strategies initially were developed to replicate the learning experiences of campus-based students. It is these experiences which appear to have led him to question the differences between teaching remotely using the Web and face-to-face teaching.

Bill's use of the Web fits well with Mayes and Fowlers' learning cycle in terms of the conceptualization, construction and dialog stages of learning. His approach is consistent with a 'learning facilitation' conception of teaching and, in the context of uses with placement students, it is consistent with the definition of networked learning.

Joan describes the use of the Web as a requirement of life and work in general. As such, knowing how to use it is considered to be essential for her professional development as well as being a medium that students need to know about and use. I have described Joan as a reluctant pioneer. She clearly has made very considerable and varied use of the Web, not through any desire or love for the Web but more because she has felt she had to. Nor has she found her experience of using it easy.

She makes use of all categories of courseware in a variety of different ways; for information access and subject presentation, for student revision

and self-testing of understanding (MCQ assessments) and through video links to external subject professionals. She designs learning activities using existing Web resources that aim to develop students' evaluative skills. This approach is consistent with the student-centered; learning focused orientation and includes some uses, which could contribute to 'intellectual development'. Joan's use of the Web is an integral part of her overall approach to teaching and within this her teaching using the Web contributes to all aspects of Mayes and Fowlers' learning cycle. Her uses could be said to be consistent with the definition of networked learning though this is not her main way of teaching and student learning.

Andrew is a minimal user but describes himself as an enthusiastic supporter of the use of the Web for teaching and learning. However, his *approach* to using the Web is closer to 'subject transmission' teaching, perhaps contributing to Mayes and Fowlers' conceptualization stage of learning. His approach does not come close to his classification of having a conceptual change *conception* of teaching. There are clearly some barriers here between his conception of teaching and his approach to using the Web for teaching. These may be indicative of Andrew's lack of knowledge of how to use the Web effectively. Andrew's use of the Web therefore plays a limited part within his overall approach to teaching.

Eddie was, like Andrew, classified as having a 'conceptual change' conception of teaching. He is a user and advocate of the Web for teaching and learning. He makes use of sophisticated primary courseware (business simulation/game) where students are presented with problem-solving and decision-making scenarios that challenge their thinking. In addition he describes the development of tertiary courseware, which combines the use of existing Web resources and e-mail dialog with external professionals, to stimulate inquiry and relate theory to practices in a live business environment. This approach is consistent with a more sophisticated student-centered, learning-orientated conception of teaching. His focus is on students' learning, his uses are to develop intellectual skills and challenge understanding and current practice. So, while there is evidence to support an 'intellectual development' conception of teaching it is difficult to find any explicit evidence to support a 'conceptual change achieving' conception from his descriptions of using the Web. However, in terms of Mayes and Fowlers' learning cycle, he uses the Web for all three stages of learning. His use may also be consistent with networked learning as defined in this volume, but again this is not the predominant teaching and learning method used.

Given this small sample of reported experience I make no attempt to generalize. What can be said is that there is some tentative evidence here, which supports previous findings, establishing a logical relationship between teach-

ers' broad *orientations* to teaching and their approaches to teaching using the Web. However, there is evidence that suggests there are factors that intervene and prevent a direct and automatic relationship between identified conceptions of teaching and approaches to teaching and learning using the Web. These factors may be considered as barriers or enablers. For example looking at Andrew, lack of technical expertise may contribute to him not being able to use the Web in line with his conception of teaching. Eddie was identified as holding a sophisticated conception of teaching but his *approach* to using the Web appears to reflect a less sophisticated conception, suggesting a barrier of a different order.

Walter is an interesting case in that while his conception of teaching has been identified as teacher-centered/subject-focused, the Web may be an enabler for him as there appears to be some evidence in his approach to teaching using the Web which suggests a leaning toward a more developed "teacher-student interaction" conception of teaching.

### *Approaches to teaching*

The next stage of analysis was to explore the complete data set with a view to identifying *motive* and *strategy* dimensions of approaches to teaching. Previous research (Biggs, 1989; Trigwell, Prosser & Taylor, 1994; Martin et al., 2000), has identified the *motive* dimension as being the teacher's conception of knowledge or conception of teaching. These two are inter-related. It might logically be assumed that a teacher with a conception of knowledge as 'existing out there' is also likely to have an 'information transmission' conception of teaching. In contrast a teacher whose belief is that the learner constructs knowledge is more likely to have a student-centered conception of teaching. A third *motive* dimension identified in the literature relates to teachers' beliefs about the source of students' motivation, i.e., whether this is intrinsic to the student or extrinsic (concerned, e.g., with getting a qualification or employment).

This part of my study concerns teachers' *motives* for using the Web for teaching. The data analyzed suggest a contrast between efficiency and effectiveness. There are some sets of motives where resource issues dominate, e.g., for convenience, cost and/or time saving in bringing information and learners together and/or coping with large numbers of students. These are related to looking for ways to do what has been done before more cheaply – as substitutes – which will reduce costs and achieve greater *efficiency* in teaching and learning. This is in contrast to motives that focus on the opportunities the Web brings in terms of networked learning to enhance the *effectiveness* of learning, by enabling collaboration, cooperation, and an inclusive and flexible approach to learning.

In each *motive* a different approach to teaching using the Web is implied. 'Efficiency' is focused around substitution and automation. 'Effectiveness' is focused on enhancement and additionally. This is explored further by identifying the underlying dimensions of these contrasting motivations to teaching using the Web.

### *Dimensions of teachers' approaches to teaching using the Web*

Data on teachers' approaches to teaching using the Web were firstly summarized, and later, quotes from the transcripts were mapped onto Mayes and Fowlers' learning cycle. Possible dimensions were generated from repeated reading of individual teacher's summaries. As possible dimensions emerged they were checked against the original data for support and either modified, merged or abandoned where no support was evident. Through this process I have identified one motivational dimension, explained above, and six strategy dimensions, suggesting the model in Figure 2.

Six dimensions of strategy are presented as polarized, or in some cases, nested dimensions.

- *Focus of use* describes a dimension where at one pole, the Web is a modern day medium used because it can provide a wealth of subject information possibly replacing other sources of subject information, e.g., books or lectures. As a nested dimension, the opposite pole may incorporate this use, but also suggests that an appreciation of the impact of the Web in modern day life is also important and that, through interaction and use, leads to knowledge construction.
- *Nature of use* describes a nested dimension where at one pole the teacher wants students to learn or know certain things and provides Web resources to enable access, practice, drills, problem solving exercises, and quizzes to test acquisition of, and ability to apply, pre-determined knowledge. The opposite pole may incorporate the same objective (i.e., another nested continuum) but due to the three-way interaction there is recognition of the requirement, and opportunity for this activity to be shaped by, and around, students' needs.
- *Role of the teacher* is a polarized dimension where at one pole the teacher is present to facilitate teaching and learning using the Web but at the other, students learn from the Web independently, without the teacher's presence.
- *Time and place of use* may, but does not have to, imply opposing approaches. For example flexible access once established will apply to both poles but 'timetabled' use of the Web may imply access only at that time. This draws parallels with asynchronous and synchronous (real time) use of the Web.

- *Role of students* ranges across the degree of freedom students have to contribute to and shape their learning, i.e., where the Web offers reactive opportunities with control remaining with the teacher, or where the Web enables more proactive opportunities by allowing students to control or share control with the teacher.
- *Relationships with students* implies a polarized continuum where, at one pole, the social dimension of learning does not feature in the choice and use of the Web, to the opposing pole where the social dimension is important.

Approaches to teaching in the literature concern teaching generally whereas the model in Figure 2 concerns teaching using the Web specifically. This analysis does not seek to imply that one approach to using the Web is better than the other but rather that different motivations can result in different ways of using the Web for teaching and learning. In campus-based teaching, the balance and relationship between teaching using the Web and face-to-face teaching has also to be considered. Teachers' motivations for using the Web are different, which may be useful in 'unpacking' teachers' conceptions of

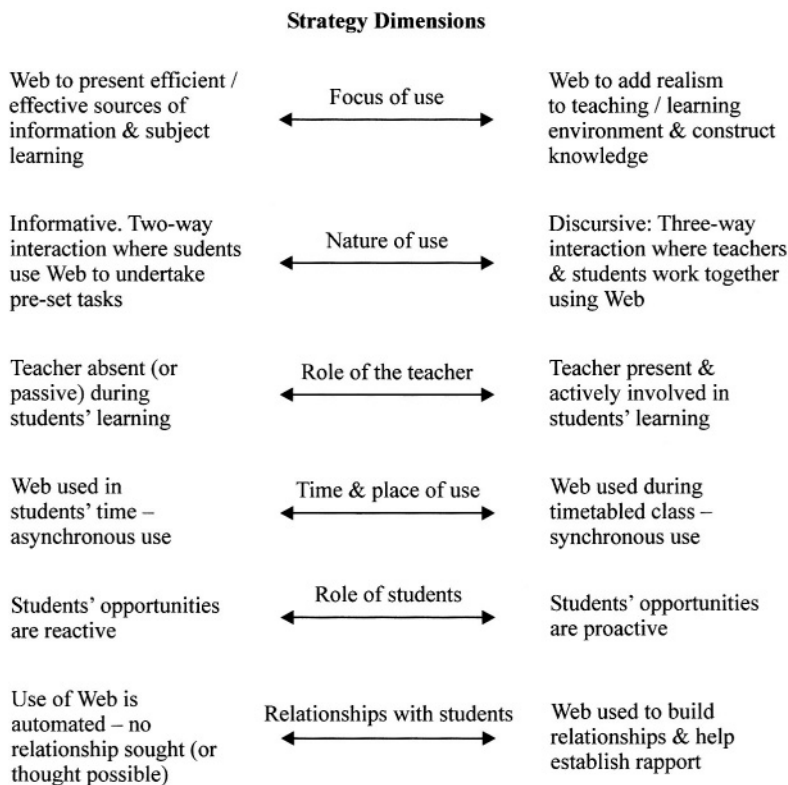


Figure 2. Approaches to teaching campus-based students using Web.



teaching using the Web. They may also be useful in informing policies or strategies to increase and/or change teachers' approaches to teaching using the Web.

## **Synthesis and conclusions**

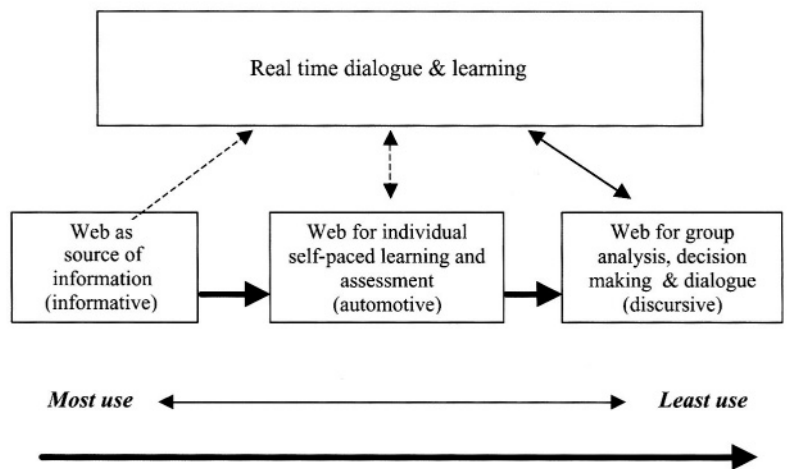
This paper claims from the outset that most teachers' reported experiences of using the Web with full-time campus-based students are far removed from the definition of networked learning underpinning the articles in this volume. The evidence and arguments presented in the main body of the paper are drawn together and summarized here. A model of three conceptions of teaching using the Web, based on the findings of this research, is proposed in Figure 3.

### *The Web used as a source of subject information*

The Web was most widely used by staff to update their own knowledge of subject information for teaching. The next most common use was to direct students to relevant Web sites for subject resources. Most teachers were using the Web as primary courseware for the conceptualization stage of Mayes and Fowlers' learning cycle. This implies a conception of the Web as a source of subject information which can be used to achieve some form of interaction between the learner's existing knowledge and new information. The learner may be the teacher preparing to teach or the student being taught. This conception may view teaching and learning using the Web as an individual and independent or directed activity. As a tool providing subject information, the Web may be considered to provide convenient, easily accessible sources of information. It may be considered to provide more vivid and clear presentation and explanations of subject information enabling quicker and better understanding. Teachers' motivations for using the Web are therefore governed by these subject-focused features and perceived benefits of the Web. The strategies of teachers with this motivation for using the Web may be identified from their descriptions of uses to 'present', 'clarify', 'elaborate', 'illustrate', etc., indicative of a subject-focused approach and consistent with the process models proposed by Martin et al. (2000) and MacFarlane and Mayes (1999).

### *The Web used for individual and independent self-paced learning*

There was less use, by teachers in this study, of the Web for task-based learning of the sort that contributes to Mayes and Fowlers' construction stage of learning. Nevertheless some teachers did use the Web as a medium, which



*Apparent incremental development of teaching campus-based students using the Web*

#### Key

- Web used to present or access subject resources – one way -----→
- Web used interactively but individually and independently to practice, develop or test understanding – two ways ←-----→
- Web used interactively as part of group class time dialogue, feedback and learning – multi-way <----->

*Figure 3. Conceptions of using the Web for teaching campus-based students.*

could enable subject analysis or subject drills, which could be performed, practiced, and assessed, resulting in learning. These may be activities done in the students' own time, capitalizing on the place, pace and time flexibilities of the Web. The Web resources were used individually and independently of other learners or the teacher. The motivation for use may have arisen from resource constraints reducing opportunities for face-to-face teaching and/or by a more student-centered/learning-focused orientation to teaching. The strategies for using the Web here may be identified from teachers' descriptions of uses to 'engage by practice', 'apply', 'consolidate', 'challenge' etc., indicative of the process models referred to above. While Web-based learning activities are consistent with Mayes and Fowlers' identification and mapping of the construction stage of learning, the Web has been used for the conceptualization stage (by some teachers), around which they construct learning activities.

*The Web used for group analysis, decision making and dialog*

Some teachers did have a more sophisticated conception of the Web as a learning environment, which enables learning relationships to be established and developed. As an electronic medium the Web can capture the otherwise transitory interactions of teacher and students. In addition, the Web can be used to extend the parameters of the learning environment (not just to distributed learners) but by drawing in external professionals and allowing access to the larger communities of practice. The dialog stage of Mayes and Fowlers' learning cycle may be evident in the strategies of teachers adopting this conception of the Web. Social and interpersonal dimensions of learning and the creation and maintenance of learning relationships are given prominence in the use of the Web for group work. Descriptions of approaches to using the Web from teachers with this conception relate to real world situations and real world access to achieve relevance, stimulate students' motivation and enhance learning. In this approach to teaching using the Web the teacher aims to be neither 'sage on the stage' nor 'guide on the side' but a legitimate 'full' participant in this community of learning.

Taken as a whole, it could be argued that the model in Figure 3 does represent networked learning as defined. However, this holistic model was rarely evident in the practice of individual teachers. Rather, the practice of most teachers reflected a partial and fragmented version of the model, with most teachers' conceptions of, and approaches to, using the Web being for subject transmission. Also important is the issue of the balance between Web-based and face-to-face teaching and learning, where, in this study, the latter was found to dominate.

Two additional conceptions of teaching using the Web have been generated from the literature. These are teaching using the Web:

- for real time dialog and learning
- for asynchronous dialog and reflective learning.

This gives a model with five distinct conceptions of teaching using the Web – as shown in Figure 4. The model shows how the Web was used differently, in line with different conceptions of teaching. It highlights passive as well as interactive uses. It suggests, as interviewees in this study suggested, that the 'conceptual change' conception of teaching was not considered to be achievable through the use of the Web alone. It suggests also that uses of the Web, as with conceptions of teaching, begin from the most basic and progress toward the most sophisticated uses and conceptions of teaching (cf. Entwistle & Walker, 2000).

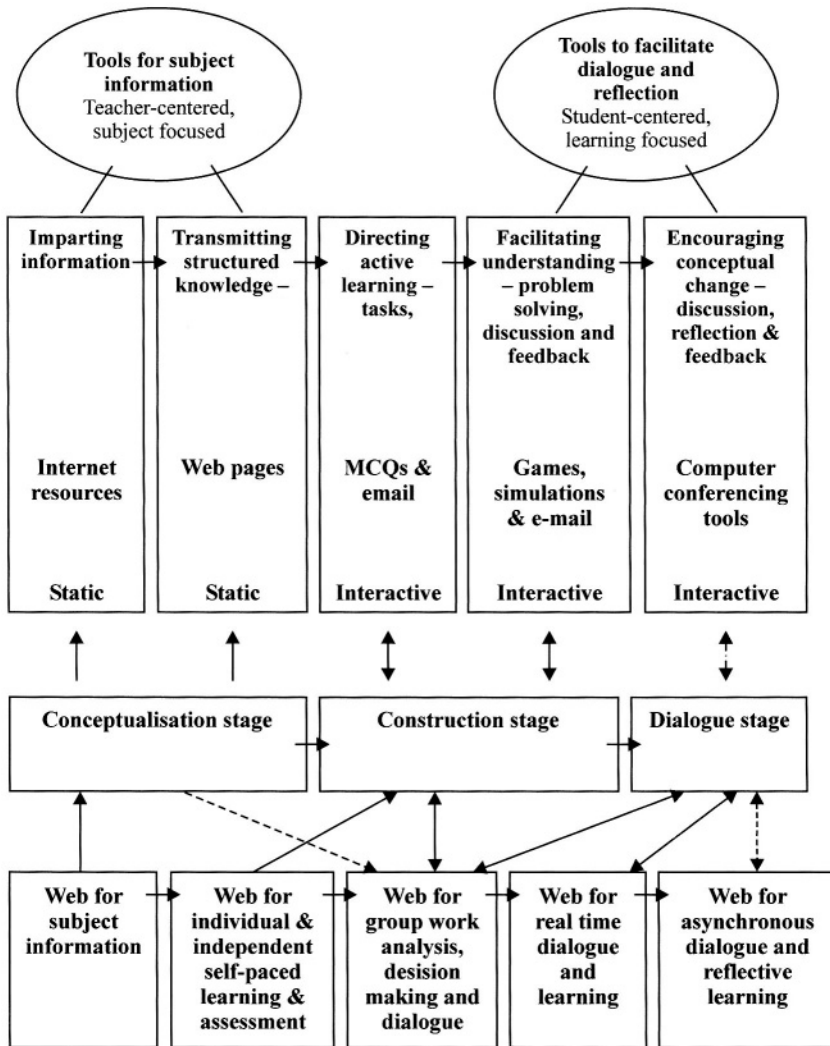


Figure 4. Mapping teaching using the Web onto Conceptions of Teaching (Kember & Kwan, 2000) and The Learning Cycle (Mayes & Fowler, 1999).

### *Towards greater uptake of networked learning*

The literature identifies a continuum of conceptions of teaching and has shown that teachers have preferred approaches to teaching, which are influenced by their conceptions. There is less evidence however of *how* teachers conceptions are actually formed and developed. Entwistle and Walker (2000) argued that initial conceptions of teaching held by novice teachers develop to become more sophisticated conceptions of teaching through reflection on

the experience of their approach to teaching. This suggests a two-way relationship where conceptions influence approaches, but also where teachers' reflections on approaches can lead to the further development of conceptions of teaching. It would seem reasonable to assume therefore that a similar relationship is likely between teachers' reflections on approaches to using the Web and the formation and development of more sophisticated conceptions of teaching using the Web.

Teachers' motivations for using the Web are linked to perceived benefits in terms of resource saving (substitutional) or teaching enhancement (additionality). I have suggested that positive experiences of teaching using the Web are likely to sustain continued use of the Web for teaching. Further I have suggested that positive experiences can result from students' feedback on teaching using the Web. (There was recognition also that demand from students for greater use of the Web in teaching and learning will create pressures for increased teaching using the Web.) I have also argued that team teaching may, through collective reflection on practice, influence approaches to teaching using the Web.

While it can be argued that the Web might be used both to save resources and *enhance quality* in teaching full-time students, there was no evidence of this in this research. None of the teachers who were motivated to use the Web to enhance teaching claimed that their use saved resources; indeed often the opposite was said to be the case. It may be logical to assume on the basis of this evidence, that networked learning is more likely to be adopted by teachers whose motivation is learning enhancement rather than resource saving. Or conversely, that where the declining unit of resource is impacting on teaching loads, there is less likelihood of networked learning being adopted.

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