

Jamieson Kane
Intranet Manager
Scotch College
Melbourne, Australia
15 January 2004

Research Paper for a Masters Thesis on:

The nature of participation, interaction and meaning construction of secondary school students engaged in asynchronous online discussion.

(i). introduction

“What Do We Already Know?”

In recent years there has been a growing interest in the use of online discussions or electronic forums across the educational spectrum. The following claims for computer-mediated communication (CMC) have been made and demonstrated by research:

- CMC is capable of creating more flexible communication patterns in the teaching-learning process (Berge & Collins, 1996; Heller & Kearsley, 1996; Ruberg, Moore, & Taylor, 1996).
- CMC allows students to interact with their instructors and peers in a time that is convenient for them (Berge & Collins, 1996; Heller & Kearsley, 1996; Ruberg, Moore & Taylor, 1996) and may increase student responsibility and self-discipline (Berge & Collins, 1996, Hsi & Hoadley, 1997).
- CMC can also equalise participation by masking social cues and cultural differences (Berge & Collins, 1996; Hsi & Hoadley, 1997).
- CMC also provides students with an opportunity to see different perspectives which may foster new meaning construction (Heller & Kearsley, 1996; Ruberg *et al.*, 1996).
- CMC forces participants to put their thoughts into writing in a way that others can understand (Koshmann, Kelson, Feltovich, & Barrows, 1996; Valacich, Dennis, & Connolly, 1994). This helps promote self-reflective dialogue as well as dialogue with others who read, react, and reply to the ideas posted by others, creating a forum for the creation of knowledge (Gay, Sturgill, Martin, & Huttenlocher, 1999; Pena-Perez, 2000).
- CMC fosters student ownership of learning and collaborative problem-solving skills, encouraging students to initiate exchanges; and potentially shifts the teacher’s role from main mediator of student contributions to a guide or prompter (Becker, 1992; Hawisher and Selfe, 2000; Luke, 1999; Sefton-Green, 1998).

- CMC is also potentially able to expose students to a broader range of views than face-to-face talk, and hence enable students to develop more complex perspectives on a topic (Curtiss and Curtiss, 1995; Prain and Lyons, 2000).

The following negative viewpoints and qualifications on the claims for CMC have been made and demonstrated by research:

- CMC in course instruction creates difficulties for some students (Berge & Collins, 1996; Heller & Kearsley, 1996; Kelly, Futoran & McGrath, 1990; McGrath & Hollingshead, 1994; Ruberg *et al.*, 1996).
- For those students in need of more structure and guidance, the increase in responsibility which CMC involves can be problematic (Berge & Collins, 1996).
- The lack of social cues in CMC environments enables some students to become antagonistic toward others. CMC, especially in asynchronous mode, may disrupt the natural flow of conversation, removing the discourse from its logical context. This can make the communication process not only inefficient, but can also lead to misinterpretations of meaning. (Kelly *et al.*, 1990; McGrath & Hollingshead, 1994)
- CMC is capable of producing patterns of exclusion in relation to gender and race (Selfe, 1990; Takayoshi, Hout and Huot, 1999), although Synder (2001) suggests that 'women and members of non-white male communities are more likely to express themselves openly through the protection of the electronic medium.' However, Hawisher and Selfe (2000) point out these claims for equality presuppose equal access opportunities and a supportive 'virtual' context.
- McConaghy and Synder (2000) note that computer-mediated communication might reinforce rather than alter existing patterns of social practices.
- Hawisher and Selfe (2000) note student participation in on-line discussion is very dependent on participant perceptions of the purposes, value and perceived rewards of this activity.
- Prain and Lyons (2000) note that effective learning occurs where teachers provide strong parameters to 'frame goals, procedures and desired products for the activities', with a clear emphasis on guided participation.
- Improved learning outcomes through the use of CMC are contingent on variables such as task, teaching style, course design, and student characteristics (Gay *et al.*, 1999; Jonassen & Grabowski, 1993; Koshmann, 1996; Kozma, 1993, Mason, 1990)
- CMC needs to be carefully integrated into the overall course activities (Gay *et al.*, 1999; Pena-Perez, 2000) since its design can affect social variables such as gender equity and peer respect (Hsi & Hoadley, 1997) as well as students' perceptions about the learning outcomes (Pena-Perez, 2000).
- The medium per se does not guarantee increased participation and interaction among students. It is very difficult to generalize about the role of different communication technologies in fostering student's participation and learning due to the individual characteristics of the learners and learning modes. (Gay *et al.*, 1999).

(ii) a description of the design of the study and the data to be collected

1. Title

The nature of participation, interaction and meaning construction of secondary school students engaged in asynchronous online discussion.

2. Abstract

A nine week study of twenty- two secondary school English students and their teacher using of an online discussion forum to respond to a novel being studied. The study will examine the participation levels and interaction between students and also the construction of meaning taking place by closely analysing the meaning of each statement posted to the discussion. This will be achieved through the coding and analysis of all posts using a category system developed and refined through a number of previous studies done at tertiary level in the United States. The study hopes to show that asynchronous online discussions can be a useful tool for teachers who seek to promote critical thinking skills, reflective thought, and in-depth analysis of course content through effective levels of participation and genuine online interaction.

3. Introduction

“What are we going to learn from this study that we don't know already?”

This study will focus on the interaction and knowledge construction of secondary school students using an asynchronous CMC environment. The intention is to use a category system to classify and understand students' interactions in online discussions and to analyse the learning taking place in this environment. I hope to learn that CMC may not only encourage collaborative learning but also may help to engage students in a process of self-reflection (by organising the thoughts and ideas to be communicated), providing students with the opportunity to explain, elaborate, or defend their positions and analyse and reflect on other students' points of view. Because it is important to understand the kinds of interactions that take place in an online discussion environment and how students construct knowledge from these interactions, this study addresses the following research questions:

“What are the major research questions?”

1. What kinds of interactions take place in a task-oriented asynchronous CMC environment?
2. What is the epistemological character of the interactions that take place in a task-oriented asynchronous CMC environment?

“Why will the answers to these questions be worth knowing?”

The use of on-line discussion for learning in secondary school contexts is still relatively under-researched. Relatively few tools are available for teacher moderators to reflect on how their online discussions may have met their purposes. Despite considerable research interest in this field, at the school level in particular there remains a need to identify ways of getting students on-line that are ‘educationally sound’, Kenway & Nixon (1999). There is also a need to strengthen theoretical understandings of what participation, interaction and meaning construction actually occurs in online discussion, and to disseminate these findings broadly to support teachers intending to use these CMC environments for student learning.

I hope to reach conclusions that will relate to classroom practice and teaching in secondary school environment. I anticipate being able to show that an asynchronous online discussion can be a useful tool for teachers who seek to promote critical thinking skills, reflective thought, and in-depth analysis of course content and peer contributions. From the analysis of the content of the online discussions I anticipate finding that:

- asynchronous discussion environments enable participants to develop sophisticated cognitive skills such as self-reflection, critical thinking and in-depth analysis of the course content, supporting the purposeful construction of meaning
- the need to articulate one's own argument in this type of text-based environment encourages students to engage in analytical and reflective action
- the process helps students construct purposeful arguments and transmit them to an audience

4. Research Context

“How does the new research question relate to what we already know?”

The very recent studies by Gay *et al* (1999) and Pena-Shaff *et al*(2001) into the nature of participation, interaction and meaning construction by undergraduate students using two different CMC environments – an asynchronous “bulletin board” and a synchronous “chat” environment – showed that the need to articulate one’s own argument in the text-based environment of asynchronous online discussion enables participants to develop sophisticated cognitive skills such as self-reflection, critical thinking and analysis, supporting the purposeful construction of meaning. They found that synchronous chat environments did not enable participants to provide the kind of environmental support necessary to enable students to display the same level of thinking and meaning construction.

Both studies, although recent, were still rather preliminary study - evaluating how students responded to both kinds of online activity with almost no intervention from instructors and without specific tasks to achieve. They both call for research into the participation, interaction and meaning construction of students working on specific tasks, with teachers moderating. They suggest research is also needed into how younger students who are perhaps not as confident in the value of their own ideas will interact and learn in CMC environments. They also call for the category system to be more fully developed and tested in order to provide educators with a tool to evaluate students’ interaction and learning that takes place in these environments. This proposed study into the nature of participation, interaction and meaning construction of secondary school students engaged in asynchronous online discussion takes up each of these recommendations for future research.

5. Research Methods

“Why has the particular method of investigation been chosen?”

Something that should be stated at the outset is that few researchers have really tackled the difficulties of analysing the *educational quality* of CMC interactions. Indeed for many years there were no tried and tested methodologies for assessing educational value, and despite the growing acceptance of qualitative approaches to research, there is still strong pressure to measure in some way the elements of ‘success’ or ‘learning’ or even ‘educational change’.

(a) Past Methodological Approaches:

Computer-generated statistical manipulations – perhaps because of concerns over subjectivity, before the 1990’s most computer conferencing research stopped with quantitative analysis of messages sent and by whom, number and time of logons, and message maps showing the number of replies and message chains. Unfortunately statistical and technical data (quantity of messages, the number of logons) came to signify the value of the educational transaction. Conclusions about the revolutionary potential of CMC were often drawn with scarcely a mention of the actual content, much less the value of the interactions. Certainly much statistical data (number/times of logons, number/length of messages sent per user) can be easily collected and manipulated in spreadsheets and supply a useful framework for evaluation, but as the only data for evaluation, it is not only inadequate, but misleading.

Survey Questionnaires – three major studies have been carried out using survey techniques, the most notable by Hiltz (1988). Using questionnaires, Hiltz studied both the technological determinants affecting use as well as the social-psychological characteristics of the users and the human interactions which might determine success. The disadvantages of surveys are well known: the wording of the questions is critical, the accuracy is dependant on respondents’ subjective impressions and memory of events, and the pre-formatted answers or number scales are confining and annoying to many respondents. As a method of evaluating group processes online, the survey is less than ideal. Group interactions are complex, whether electronic or face-to-face; they thus make poor subjects for pre-structured answers.

User interviews – many studies and evaluations of computer conferencing have used some form of direct contact with users – either by telephone, by computer or face-to-face. The most extensive analysis of interview data is that by Burge (1992). By extensive questioning of adult learners studying an online course, she investigated a number of typical claims made about educational computer conferencing. The importance of this methodology lies in its grass-roots nature – asking those who live the experience to report their reactions. Nevertheless, carrying out face-to-face interviews is time consuming and the subsequent analysis of the transcripts requires even more care and attention. A real disadvantage has been the resource implications of interviewing a wide enough sample to be able to make significant generalisations.

Controlled Experimentation – There have been a number of controlled experiments in laboratory conditions: Kiesler (1984), refined by Lea and Spears (1991), exploring the impact of computer communication on group decision processes such as reaching consensus. In laboratory evaluations of computer-mediated behaviour particular issues or controversies can be investigated very directly. All the variables and contextualisation of other methods can be controlled, and results can be replicated and refined. Because of this ability to focus and control the environment, empirical experimentation is particularly appropriate for investigating group working online. However, the disadvantages of the method lie in the limitations imposed by laboratory conditions, both for the participants, and also for the type of issues and situations which are susceptible to study this way.

Case Studies – Participant observation of CMC environments, pioneered by Mason (1989) has been a significant tool used by case studies ever since to collect data on students, tutors and course designers of computer-mediated environments. The advantages of this method are that it is possible to give a rich and wide-ranging picture of a conferencing environment, providing multiple points of view and to develop standards and theory which can be tested by other methods and environments. The disadvantages are that the results, which are rich in process, cannot easily be generalised to other instances and contexts. It is often difficult to isolate the most important factors amongst such a wealth of detail.

Content Analysis – The most obvious data available to conferencing evaluators – the transcript of all conference interactions – has paradoxically been the least used until relatively recently. Given the advantages and disadvantages of each method above, the challenge of content analysis needs to be further taken up both as the key to increasing professionalism in the field of CMC research and as the essence of the educational value of the activity. The next section of this proposal below examines the methodological approach of content analysis of data obtained from CMC environments as the tests for what the focus of this study – participation, interaction, meaning construction – have been developed and refined during the last ten years.

(b) A rationale and context for the use of Content Analysis as the principle research method in this study

As discussed above, before 1990 few studies had focused on the analysis of CMC conference transcripts "as the key methodology for establishing the educational value of this medium" (Mason, 1991). But in 1990, Levin, Kim, and Riel developed a number of sequential techniques for analysing the interchange of electronic text messages. Among them, the "message act analysis," was developed as a first attempt to begin identifying "the functions that each message is to accomplish". By using this technique the researchers coded CMC messages according to whether they referenced explicitly (using the "reply" or "answer" command or addressing another message) or less explicitly (supplying an answer to a question asked on a previous messages) to another message. The information gathered through this technique enables a researcher to create a message map that describes multiple threads of interwoven discussion. This study only evaluated the participation and patterns of interaction and not the social and cognitive processes of students engaged in electronic discussions, the techniques developed by the researchers provide the framework for further analysis of the content of the messages.

Henri (1991) developed a theoretical framework for analysing the content of electronic messages. She described five dimensions on which CMC can be evaluated: (a) participative; (b) social; (c) interactive; (d) cognitive; and (e) metacognitive. More recently, Henri and Rigault (1996) have developed tools for describing: a) the contextual elements of the messages; and b) quantitative data about participants' performance regarding language, cognitive functions, interactions, and knowledge transmission. According to Henri and Rigault (1996), their results "show that it is very possible to bring to light the cognitive and metacognitive strategies used by the learners" (p. 73).

Based on Garrison's (1991, 1992) stages of critical thinking and Henri's (1991) dimensions, Newman, Webb, and Cochrane (1995) used content analysis to evaluate the quality and type of learning taking place in three undergraduate level seminars conducted both face-to-face and through computer conferencing. The authors developed a set of paired indicators (positive and negative indicators of critical thinking) to evaluate critical thinking processes in the social context of online as well as face-to-face seminars. Transcripts from both kinds of seminars

were analysed by marking each statement that indicated either deep (+) or surface (-) critical thinking. From these statements, they totalled the frequencies for each indicator and calculated the ratios of the depth of critical thinking by the total of positive and negative statements to a -1 to +1 scale. The results based on a small-scale experiment showed that students in CMC-based seminars had more positive critical thinking statements. Even when students said less in the CMC seminars than in the face-to-face seminars, students in CMC seminars more often used outside material and experiences in their discussions, were better at linking ideas together, and made important statements about the topic under discussion. Although their sample, was very small this content analysis technique provides a framework to study different aspects of critical thinking in group learning.

Zhu (1996), using a constructivist framework approach, analysed knowledge construction in a 16-week postgraduate distance learning course using asynchronous computer conferencing among other distance learning technologies such as video conferencing and videos. Zhu performed a quantitative analysis of all the data collected from the online conference discussions plus a more exhaustive qualitative analysis on two randomly selected weeks, in which messages were coded into participation categories and participants' role. The researcher developed a coding scheme consisting of participant categories (contributor, wanderer, seeker, and mentor), types of interaction based on Hatano and Inagaki's (1991) theory of group interaction (vertical and horizontal), and notes-meaning categories (question, answer, reflection, comments, discussion, information sharing, scaffolding, and answer).

Zhu's study results showed high levels of participation with over 73% of the students participating in the weekly discussions. Specific analysis of the two randomly selected weeks showed that almost all students were contributors to the discussions and that instructors acted like mentors during the electronic discussions. Student contributions to the discussion during the selected weeks were categorized as discussion (41%), comment (23%), reflection (6.2%), information sharing (5%), and scaffolding (9%). Few information-seeking questions were found and the predominant type of interaction was horizontal. Zhu's analysis also showed diversity in the discussion. As Zhu stated, even when "each note was discussing the same topic, each perspective was quite idiosyncratic and based on the individual's understanding and experiences" (p. 837). The results of this study show that CMC supports the social construction of knowledge.

The studies by Henri Newman *et al.* (1995) and Zhu (1996) provide a valuable framework for the study of CMC discussions. However, most of the category systems were developed prior to the analysis of the data, and in some cases (Newman, Johnson, Cochrane, & Webb, 1996) the coding system did not provide descriptors to help identify in the content of the messages similar indicators of critical thinking. However, their category systems, as well as Henri (1991) and Henri & Rigault (1996) provided a valuable framework for the construction of a category system – see Appendix 1 - that guided a more recent study by Pena-Schaff *et al.* (2001) into the nature of participation, interaction and meaning construction by undergraduate students using two different CMC environments – an asynchronous “bulletin board” and a synchronous “chat” environment.

(c) The Overall Design of the Study

i) setting and participants

The data from this study will be collected over a 9 week term from a Year 11 secondary school English class in an independent boys school in Melbourne. The 22 students in this class will meet on a daily basis with their teacher. During the term the student will read and discuss a set novel. The class will take a constructivist approach to learning, in which students will be required to develop their own points of view on the novel in relation to a number of topics. This approach is designed to be part of the preparation for an assessment task at the end of the term requiring them to present their point of view on a particular topic in an essay format.

During the semester, students will – at least once a week - use an asynchronous discussion board for class discussions, brainstorming, and activities, either out of class or during class time to develop an argument to defend their position about a certain topics. The discussion board will be accessed through the class web site, which will serve as the central resource for students. The internet-based discussion board system designed for asynchronous communication will consist of a main web page where all the messages posted will be listed by topic and date of posting with the latest messages on top, showing the discussion thread for each topic as an outline or table of contents.

Because of its hyperlink capabilities, students will easily be able to select messages to read and reply to. The discussion board will provide a semi-structured environment. Students will be required to post a message in response to a weekly “set topic activity”, which will require them to both develop an argument to defend their position about that topic, and to respond to posts made by other class members that week. The discussion board will only become active after the first week of class, when instructions on how to access it and the expectations of class participation are given out. Students will be able to access all messages posted during the term at any given time.

ii) relationship of researcher to participants

I work at the same school as the English teacher and students involved in the study. I am also an English teacher at the school and also a “Learning Technologies” facilitator. Part of my role is to work with teachers in implementing technology to support learning. I will closely work with the English teacher involved in the study in the design on the text-study unit and the discussion questions and moderation. I have a bias towards the study in that I want the online discussion to be successful. I am looking to see increased participation, interaction and meaning construction by students in the discussion forum.

iii) sampling

This study is a case of purposive sampling by convenience but the students will be a random selection of one independent Melbourne boys school’s Year 11 students. No streaming or blocking occurs in English classes at the school. The 22 have not yet been allocated to this teacher for 2004. Neither this teacher nor myself have any control over the allocation. In some ways the purposive sampling of these students is also called for because only a small minority of secondary schools in Australia are currently using online discussions as part of their teaching program and this school is one of those. Such ‘deviant’ sampling is useful as the site is at the moment unusual, special, and hopefully enlightening.

iv) practical considerations for data collection

Data about the kinds of interactions will be gathered from the electronic transcripts of the discussion board (which will include an outline of the thread of interactions and the transcripts of the messages). These transcripts will provide information about message posting and communication patterns, and thought processes about the topics being discussed.

The messages will be printed and organised in chronological order. All postings will be used to examine participation rates and flow of interaction, but only one week will be selected for the content analysis. Although initially messages from several weeks will be coded, one week will be selected for a more in-depth analysis.

Permission to use / record participant's text posted to the discussion will be sought – from both the students and their parents via a letter with tear off permission slip, and the teacher and school management.

v) methods of data analysis

All messages posted by each individual student on the discussion board sent under the different usernames will be tallied to determine participation rates. Also, to analyse group interactions, all threads of the discussion board postings will be analysed according to the "message act analysis protocol" and the "message map" developed by Levin *et al.*, (1990). The message act analysis will help identify whether the messages initiated a new topic, replied to a previous message, evaluated a previous message or were just independent messages. Any clusters of messages identified will be represented using the "message map" to provide a visual representation of the sequence of messages displayed in the online discourse, and the interactivity of the discussions taking place. This graphical representation will make visual each reference of one message to another as a link, to simplify the analysis of: (a) the thread of discussion, (b) topic initiators, and (c) posting statistics. Hopefully this model will be very useful in the analysis, not only for identifying the interaction patterns between teacher and students but also for visualising and analysing the sequence of interactions.

Content analysis of electronic discourse has been mainly quantitative and the category systems used to analyse the messages have usually emerged from criteria established a priori and usually based on categories used in the analysis on other types of texts - Merriam (1998). In this study, an initial set of indicators based on previous research on epistemological development by King & Kitchener (1994) and the category systems and content analysis of on-line communication used by Henri (1991); Henri & Rigault, (1996); Newman *et al.* (1995); Zhu (1997), as refined by Pena-Schaff *et al* (2001) will be used. However, it is anticipated that new categories and themes that emerge during the initial analysis of the data will change and re-shape the original category system leading to the further refinement of the category system by this study. The testing and further development of the category system used by researchers using content analysis methodology is certainly one of the aims of this study.

First, all the messages from the discussion board will be read. Then the content of the messages on the discussion board of the week chosen for content analysis will be analysed and coded in different categories according to message type, using the category system referred to above and attached as an Appendix 1 at the end of this proposal. The basic unit of analysis will be sentences within the messages. Therefore, one message could represent multiple categories depending on the thinking processes the participant showed in the text or a single category if only one was reflected in the text.

The category system will enable analysis of the messages at two different levels. The first level relates to whether the messages were or were not interactive. The second level is based on the type of learning process taking place.

It is anticipated that in the data analysis, two different levels of interactivity will be found: monologue messages and interactive messages. Monologue messages refer to independent statements related to the subject under discussion that do not seem to answer or refer to a previous message, or lead to further discussion. Interactive messages refer to explicit or implicit interactions in which the participants refer to another message or person, respond or add a commentary to a previous message or posted question.

It is anticipated that in analysing the learning processes within the messages, 13 different categories of which 12 could be directly related to learning and one related to social interaction will be found (see Appendix 1) but also that as stated above it is anticipated that new categories and themes that emerge during the initial analysis of the data will change and re-shape the original category system leading to the further refinement of the category system by this study.

6. Trustworthiness and Rigour

“How will we know that the conclusions are reliable and valid?”

Content analysis of computer-mediated conferencing as a methodology must be equipped to resist the subjective manipulations of the encoder and of the educator/analyst. Only thus is the process safeguarded, and the credibility and validity of the practice of content analysis guaranteed. A key element in this protection has been to define rigorously the aims of the analysis, the theoretical framework, and the analytical criteria. This has been a concern throughout this proposal in presenting the theoretical foundations of the proposed analysis. The content analysis approach is not yet perfected; if it is to become a workable tool for educators, progress must be made at the conceptual level, where methods must be further refined, and at a technical level, where the analytical tools must be made more user friendly. This study hopes to contribute to that progress.

Furthermore, I am seeking to present my proposal for scrutiny by many of the academics mentioned in the literature review in the introduction of this proposal, and particularly Pena-Schaff, Martin and Gay (2001) at the United States' National Education and Computing Conference (NECC) in June 2004. In a roundtable discussion of this proposal and its methods, I hope to get feedback and criticism on my research from leaders in the field.

This proposal also seeks trustworthiness by being transparent about its assumptions: Methodological rigour does not prevent the adoption of a point of view and this study certainly holds a cognitive view which values collaborative approaches to the construction of knowledge. This is not an unpopular view of teaching and learning today. Secondly, the study assumes that the replying to, direct address to, or answer to, one message by another on the discussion board can be taken for interaction, indeed for collaboration in the construction of knowledge. Finally, the whole undertaking is posited on the idea that written text can transparently reveal the thinking going on behind it. Much work, from Vygotsky on, has substantiated the very close link between thought and language.

Finally, use of descriptive data and verbatim quotes from the actual discussions will be used to back up all claims in the thesis, and an computerised 'audit trail' will be kept so that any discussion comment can be traced back to its source to prove authenticity..

7. Ethical Considerations

Avoiding the of a Negative Impact on Students' Grade in the Subject or the wider VCE - Although the text-response essay at the end of term will be assessed, in order to protect students, all text posted to the discussion will not form the basis of any assessment for the purposes of the VCE or other graded outcomes. Students will be informed of this before the study. Students will also be informed they do not need to take part in the online discussions and that whether they take part or not will not effect their final grade in any way either. This process protects the students but still means the students will be motivated to contribute to the discussion to generate contentions, debate evidence and hear other points of view on the text – as the vital preparation for writing the essay at the end of the term.

Avoiding the researcher becoming too involved in the local issues – Although I work at the same school and in fact quite closely with the class teacher, by not using my own class I am hoping to be 'one step removed' from the online discussions but not too far away. I will not participate in the discussions myself, nor speak with the students about their contributions at any satge. I think a reasonable balance has been struck between being too heavily involved and being too removed.

Ensuring the confidentiality of data and preservation of the anonymity of participants. I will not mention the school, students' or teacher's names in the write-up of the study, only describing the school as a 'Melbourne independent boys school'.

The audience being unable to distinguish between data and the researcher's interpretation. By being as transparent as possible – using heavy use of descriptive data, verbatim quotes and via a clear audit trail to both the raw data and coded data – I hope to successfully manage the risk of this problem in the write-up of the study.

8. Timeline

Literature Review / Preliminary Proposal:	June to November 2003
Methodology Development / Research Proposal :	September to December 2003
Collection of Data:	April to June 2004
Analysis of Data:	July to September 2004
Write-up of Thesis:	October to December 2004

9. References

- Becker, H. (1992). A model for improving the performance of integrated learning systems: Mixed individualized/group/whole class lessons, cooperative learning, and organizing time for teacher-led remediation of small groups. *Educational Technology* 32, 6-15.
- Berge, Z., & Collins, M. (1996). Computer mediated communication and the online classroom: Overview and perspectives. In B. Collins (Ed.), *Computer Mediated Communication* (Vol. I, pp. 129-137). New Jersey: Hampton.
- Burge, E. (1992) PhD Thesis. Toronto: Ontario Institute for Studies in Education 1992.
- Curtiss, P. & Curtiss, K. (1995). What 2nd graders taught college students and vice versa. *Educational Leadership* 53, 28-33.
- Gay, G., Sturgill, A., Martin, W., & Huttenlocher, D. (1999, June). Document-centered peer collaborations: An exploration of the educational uses of networked communication technologies. *Journal of Computer-Mediated Communication* 4(3). M. McLaughlin & S. Rafaeli (Eds.). [Online]. Available: <http://www.ascusc.org/jcmc/>
- Green, B. (1988) Subject-specific literacy and school learning: A focus on writing. *Australian Journal of Education* 32 (20), 156-79.
- Gruber, S. (1995). Re: ways we contribute: Students, instructors and pedagogies in the computer-mediated writing classroom. *Computers and Composition*, 12 61-78.
- Hammond, M. (1998). Learning through on-line discussion: What are the opportunities for professional development and what are the characteristics of on-line learning? *Journal of Information Technology for Teacher Education*, 7, 329-346.
- Harasim, L. (Ed.). (1990). *Online Education: Perspectives on a New Environment*. New York: Praeger.
- Hawisher, G. & Selfe, C. (2000) (eds) *Global literacies and the World-Wide-Web*. London & New York: Routledge.
- Heller, H., & Kearsley, G. (1996). Using a computer BBS for graduate education: Issues and outcomes. In Z. Berge & M. Collins (Ed.), *Computer-mediated communication and the online classroom*. (Vol. III: Distance learning, pp. 129-137). NJ: Hampton Press.
- Henri, F. (1991). Computer conferencing and content analysis. In A. Kaye (Ed.), *Collaborative learning through computer conferencing* (Vol. 90, pp. 117-136). Berlin: Springer-Verlag.
- Henri, F., & Rigault, C. (1996). Collaborative distance learning and computer conferencing. In T. Liao (Ed.), *Advanced educational technology: Research issues and future potential* (Vol. 145, pp. 4576). NY: Springer.
- Hiltz, R.S. (1988). Learning in a Virtual Classroom. Final evaluation report. Research Report 25. Newark, N.J. Computerized Conferencing and Communications Center, New Jersey Institute of Technology.

Hoadley, C., & Enyedy, N (1999). Between information and communication: Middle spaces in computer media for learning. CSCL'99 Proceedings. [Online}. Available: <http://kn.cilt.org/csc199/A30/A30.htm>

Hsi, S., & Hoadley, C (1997). Productive discussion in science: Gender equity through electronic discourse. *Journal of Science Education and technology*, 6(1), 23-36.

Hunt, R. (1996). Collaborative Investigation online: Eighteenth century literature moves to the computer lab. In Z. Berge & M. Collins (Eds.), *Computer mediated communication in the online classroom* (Vol. 2, pp. 93-110). Cresskill, NJ: Hampton Press.

Jonassen, D., & Grabowski, B. (1993). *Handbook of individual differences, learning and instruction*. NJ: Lawrence Erlbaum.

Kelly, J, Futoran, G., & McGrath, J. (1990) Capacity and capability: Seven studies of entrainment of task performance rates. *Small Group Research*, 21(Aug), 283-314.

Kenway, J. & Nixon, H. (1999). Cyberfeminisms, cyberliteracies, and educational cyberspheres. *Educational Theory* 49 (4), 457-474.

Kiesler, S., J. Seigel and T. McGuire 1984). (Social psychological aspects of computer-mediated communication. *American Psychologist*, 39, 10, 1123-1134.

King, P., & Kitchener, K. (1994). *Developing reflective judgement: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco, CA: Jossey-Bass.

Lankshear, C., Gee, J., Knobel, M., & Searle, C., (1997a). *Changing Literacies*. Buckingham, UK : Open University Press.

Lankshear, C., Bigum, C., Durrant, C., Green, B., Honan, E., Morgan, W., Murray, J., Synder, I. & Wild, M. (1997b). *Digital rhetorics: Literacies and technologies in education – current practices and future directions*. Vols 1-3. Canberra : DEETYA.

Lea, M. and R. Spears (1991). Computer-mediated communication, de-individuation and group decision making. *International Journal of Man-Machine Studies*, 34, 283-301

Levin, J., Kim, H., & Riel, M. (1990). Analyzing instructional interactions on electronic message networks. In L. Harasim (Ed.), *Online education: Perspectives on a new environment* (pp. 185-213). New York: Praeger.

Love, K. (2000a). The construction of moral subjectivities in talk around text in secondary English. *Linguistics in Education*, 11, 213-249.

Love, K. (2000b, July). Report on the evaluation of on-line discussion at a senior secondary school Parkville, Australia: University of Melbourne, Department of Language, Literacy, & Arts Education.

Love, K. (2002). Mapping online discussion in senior English : this report on a new area of research has practical implications for text response in the secondary classroom. *Journal of Adolescent & Adult Literacy*, 45, 5, 382-396.

- Luke, C. (1999). Cyber-schooling and technical change: Multiliteracies for new times. In B. Cope and M. Kalantzis (eds) *Multiliteracies: literacy learning and the design of social futures*. Melbourne: MacMillan.
- Mason, R. (1989). A case study of computer conferencing at the Open University. PhD Thesis. CITE Thesis No.6. The Institute of Educational Technology. Milton Keynes : The Open University.
- Mason, R. (1990). Conferencing for mass distance education. Paper presented at the Third Guelph Symposium on computer mediated communication, University of Guelph, Guelph, Canada.
- Mason, R. (1991). Developing a learning community in distance education. Paper presented at the Applications of Computer Conferencing to Teacher Education and Human Resource Development. Proceedings from an International Symposium on Computer Conferencing, OH.
- Mason, R. (1992). Evaluation methodologies for computer conferencing applications. In A.R. Kaye (Ed.), *Collaborative learning through computer conferencing. The Najaden papers*. (pp. 105-116.). New York: Springer-Verlag.
- McConaghy, C. & Synder, I. (2000). Working the web in postcolonial Australia. In G. Hawisher & C. Selfe (eds) *Global literacies and the World-Wide-Web*. London & New York : Routledge.
- McGrath, J., & Hollingshead, A. (1994) *Groups interacting with technology: Ideas, evidence, issues and an agenda*. Thousand Oaks, CA: Sage.
- Newman, D., Johnson, C., Cochrane, C., & Webb, B. (1996). An experiment in group learning technology: Evaluating critical thinking in face-to-face and computer-supported seminars. *Interpersonal Computing and Technology*, 4(1), 57-74.
- Newman, D., Webb, B., & Cochrane, C. (1995). A content analysis method to measure critical thinking in face-to-face and computer supported group learning. *Interpersonal Computing and Technology* 3(2), 56-77.
- Paulsen, M.F. (1996). Moderating educational computer conferences. In Z. Berge & M. Collins (Eds.), *Computer mediated communication in the on-line classroom* (Vol. 3, pp. 81-89). Cresskill, NJ: Hampton Press.
- Pena-Perez J (2000). Participation, interaction and meaning construction in a university-level course using a computer bulletin board as a supplement to regular class discussions. A case study. Unpublished doctoral Dissertation, Dept. of Education, Cornell University, Ithaca, NY.
- Pena-Shaff J., Martin, W., & Gay, G. (2001). An Epistemological Framework for Analyzing Student Interactions in Computer-Mediated Communication Environments. (Internet/Web/Online Service Information) *Journal of Interactive Learning Research* 12, 1, 41
- Prain, V. & Lyons, L. (2000) Using information and communication technologies in English: An Australian perspective. In A. Goodwyn (ed.). *English in the Digital Age*. London : Cassell Education.

Prian, V. (2003). Planned conversations: learning in senior secondary English through online discussion. *Curriculum Perspectives*, 23, 1, 9-19.

Rohfeld, R., & Hiemstra, R. (1996). Moderating discussions in the electronic classroom. In Z. Berge & M. Collins (Eds.), *Computer mediated communication in the on-line classroom* (Vol. 3, pp. 94-104). Cresskill, NJ: Hampton Press.

Ruberg, L., Moore, D., & Taylor, D. (1996). Student participation, interaction, and regulation in a computer-mediated communication environment: A qualitative study. *Journal of Educational Computing Research*, 14(3), 243-268.

Scardamalia, M. (1999). Developing a technology of use for computer supported intentional learning environments. Paper presented at the Eighth European Conference on Research on Learning and Instruction, Goteborg, Sweden, August 24-28.

Scardamalia, M., & Bereiter, C. (1996). Computer support for knowledge-building communities. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 249-267). NJ: Lawrence Erlbaum.

Sefton-Green J. (ed) (1998). *Digital diversions : Youth culture in the Age of Multimedia*. London: University College London Press.

Selfe, C. (1990) Technology in the English classroom : Computer through the lens of feminist theory. In C. Handa (ed) *Computers and community: Teaching composition in the twenty-first century*. Portsmouth NH: Boynton Cook.

Selfe, C., & Hilligoss, S. (Eds.). (1994). *Literacy and computers: The complications of teaching and learning with technology*. New York: The Modern Language Association of America.

Synder, I. (2001) A new communication order: researching literacy practices in the network society, *Language and Education*, 16 (2&3), 117-131.

Takayoshi, P., Huot, E., & Hout, M. (1999). No boys allowed : The world wide web as a clubhouse for girls. *Computers and Composition: An International Journal for Teachers of Writing*, 16, 89-106.

Valacich, J., Dennis, A., & Connolly, T. (1994). Idea generation in computerbased groups: A new ending to an old story. *Organizational Behavior and Human Decision Processes*, 57(Mar.), 448-467.

Yagelski, R. & Grabill, J. (1998) Computer-mediated communication in the undergraduate writing classroom: A study of the relationship between online discourse and classroom discourse in the two writing classes. *Computers and Composition*, 15, 11-44.

Zhu, E. (1996). Meaning negotiation, knowledge construction, and mentoring in a distance learning course. Paper presented at the Proceedings of Selected Research and Development Presentations at the 1996 National Convention of the Association for Educational Communications and Technology, Indiana, 821-842.

10. Appendices

APPENDIX 1: Category System - Developed by Pena-Shaff *et al* (2001)

CATEGORY	DESCRIPTION
Monologue messages - Not necessarily interactive	
Reflective analysis (RA)	<p>Self-questioning: Questions answered by the participant in the same message - questioning him/herself about the topic.</p> <p>Analysis-Reasoning: Decomposition of ideas, searching for causes and consequences, evaluating ideas, self-explanations, and self-arguments.</p> <p>Conclusion building: Reaching conclusions based on self-analysis of facts and ideas.</p> <p>Hypothesis building: Developing hypothesis based on the readings, own arguments and other participants' comments.</p> <p>Inferences.</p> <p>Use of analogies: using previous knowledge, comparison to similar situations in other areas.</p> <p>Surprise: Acknowledgement of finding something new, learning something new.</p>
Subjective Analysis (SA)	<p>Value-based: Messages showing strong personal beliefs.</p> <p>Non-objective analysis. Strong ethical and moral arguments toward the issue being addressed.</p> <p>Emotional responses: Expression of feelings detonated by the reading assignment.</p>
Task Related (TR)	<p>Reading-related: Referring to, paraphrasing, summarizing or using ideas from the readings.</p> <p>Class-related: Referring to or summarizing issues discussed in class or using as example class activities and discussions.</p> <p>Focusing: Bringing online discussion back to focus when deviated.</p>

Both interactive and non-interactive

Assertion (A)	Maintaining, providing arguments to defend their points of view.
Experiential (E)	Using personal experiences and previous knowledge that relate to the topic being discussed.
Topic Evaluation (TE)	Analyzing text orientation, what is ignored or included in the text, analyzing author's position.
Off Task (OT)	Messages not related to the topic under discussion.

Interactive messages -

Question (Q)	Posing questions that need some sort of reply from the group: clarification, explanation, examples, etc.
Reply (R)	Answering other participant's Question either directly or indirectly. "Responding to XXX question, I think..." or addressing the issue without making reference to the question being responded.
Support (S)	Agreement: Agreeing with other people's ideas either explicitly "I agree with.." or indirectly "I would like to add" or "I also think that..." Empathy: Sharing feelings with other participants' comments. Acknowledgment: Acknowledging other participants' ideas & comments. Feedback: addressing other people's comments, acknowledging their concerns. Conflict: disagreements, Argumentation, friction, negotiation
Consensus Building (CB)	Reaching agreement: building arguments collaboratively, generating group conclusions.
Clarification/elaboration (CE)	Brainstorming: Idea-generation, presenting different ideas and arguments. Providing examples, arguments and ideas to answer other participants' questions, or to explain own argument.
Social interaction (SI)	Greetings, jokes, expression of emotions based on other people's comments (laugh, surprise and discomfort), use of nicknames.