Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education[1]

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The purpose of this study is to provide conceptual order and a tool for the use of CMC and computer conferencing in supporting an educational experience. Central to the study introduced here is a model of community inquiry that constitutes three elements essential to an educational transaction – cognitive presence, social presence, and teaching presence. Indicators (key words/phrases) for each of the three elements emerged from the analysis of computer conferencing transcripts. The indicators described represent a template or tool for researchers to analyze written transcripts as well as a guide to educators for the optimal use of computer conferencing as a medium to facilitate an educational transaction. This research would suggest that computer conferencing has considerable potential to create a community of inquiry for educational purposes.

The use of computer-mediated communication (CMC) is becoming increasingly common in higher education. Many higher education institutions are looking to CMC, particularly computer conferencing, as a versatile medium for the delivery of educational programs "anytime, anywhere." While those leading the development of this new medium are convinced of its potential, its effects on the quality of the learning process and its outcomes have not been well studied. The authors are engaged in a multi-faceted study that will help to remedy this gap in our knowledge base. The present paper is the keystone of a series of publications reporting the results of this ongoing research project.

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This paper lays out a conceptual framework that identifies the elements that are crucial

prerequisites for a successful higher educational experience. These elements and their interrelationships

are outlined briefly in this paper. Other papers in this series will examine individual elements in some

detail, with particular attention to how these crucial components of the higher education experience can

be maintained when higher education is moved into a CMC environment.

Figure 1: Elements of an educational experience
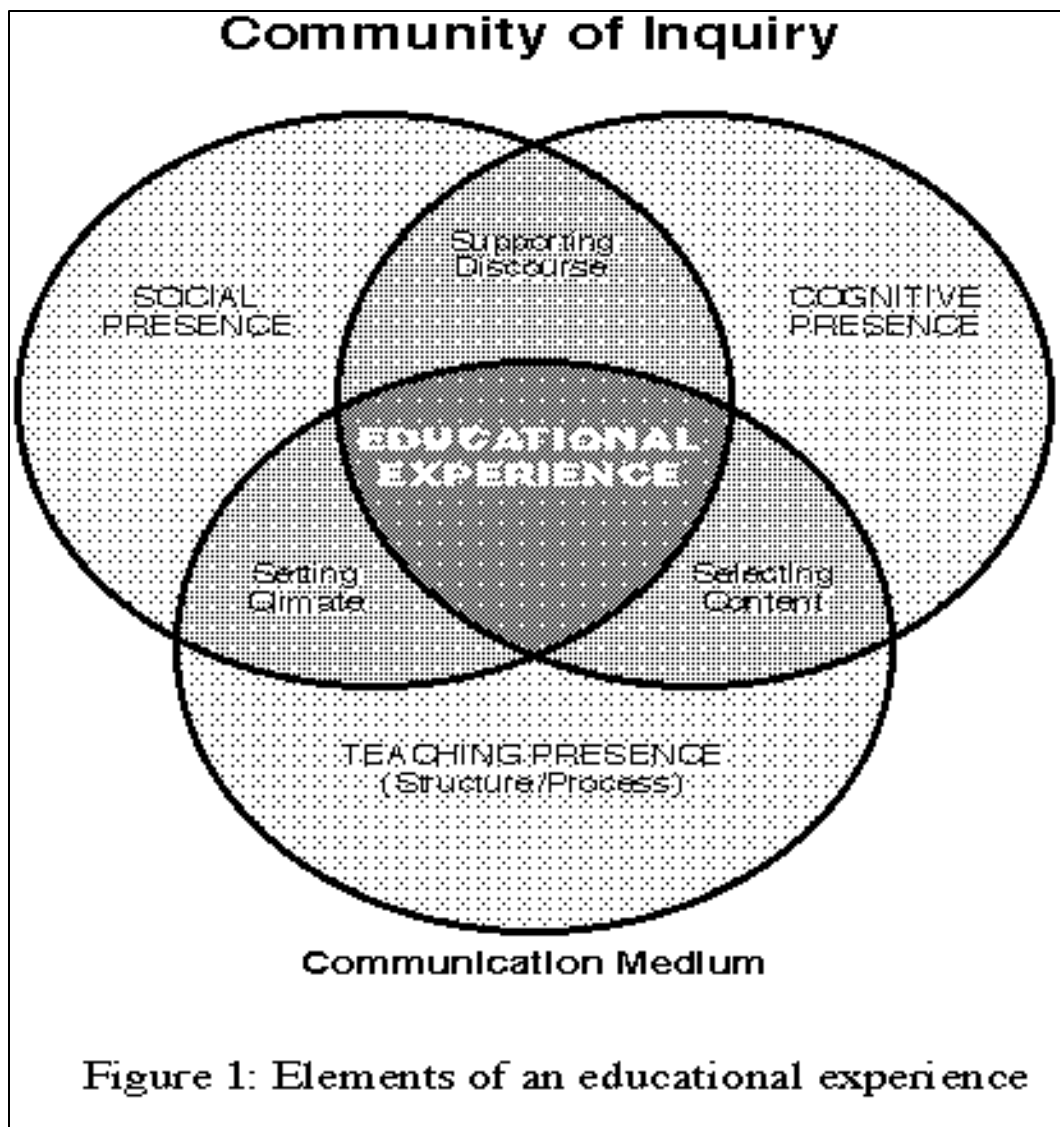
As shown in Figure 1, a worthwhile educational experience is embedded within a Community of Inquiry that is composed of teachers and students - the key participants in the educational process. The model of this Community of Inquiry assumes that learning occurs within the Community through the interaction of three core elements. Figure 1 shows the three essential elements: cognitive presence, social presence, and teaching presence.

In our investigation of computer conferences used for educational purposes, we look for postings or segments of postings that show that these three essential elements are present. That is, we look for indicators of cognitive presence, social presence, and teaching presence. These indicators consist of the occurrence of certain key words or phrases, or synonyms thereof. For reasons associated with ease of application, precision and order, we have grouped these indicators into categories so as to indicate more clearly the phase or aspect of each element that is being demonstrated by each group of indicators.

Table 1 illustrates the relationship among the three essential elements in a community of inquiry, as well as the indicators of those elements that occur in a computer conference or other venue for a true community of inquiry, and the categories into which we have grouped the indicators. The names of the categories were chosen so as to be somewhat self-explanatory. However, each category is given a full description in a later section of this paper.

Elements	Categories		Indicators (examples only)	
Cognitive Presence	Triggering Event		Sense of puzzlement	
	Exploration		Information exchange	
	Integration		Connecting ideas	
	Resolution		Apply new ideas	
Social Presence	Emotional Expression		Emoticons	

	Open Communication	Risk-free expression
	Group Cohesion	Encouraging collaboration
Teaching Presence	Instructional Management	Defining & initiating discussion topics
	Building Understanding	Sharing personal meaning
	Direct Instruction	Focusing discussion

Table 1. Community of Inquiry Coding Template

The element in this model that is most basic to success in higher education is cognitive presence. This term is here taken to mean the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication. Although this is far from unproblematic even in traditional face-to-face educational settings, it is particularly worthy of attention when the medium of communication changes, as in the adoption of CMC for educational purposes. Cognitive presence is a vital element in critical thinking, a process and outcome that is frequently presented as the ostensible goal of all higher education. The authors of this paper have treated this subject in a number of previous and current works (Anderson & Garrison, 1995; Garrison, 1991; Garrison & Archer, in press). A substantial portion of the present paper is also devoted to it, with specific attention to the relationship between this most basic element and the remaining elements in the Community of Inquiry model.

The second core element of the model, social presence, is defined as the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as "real people." The primary importance of this element is as a support for cognitive presence, indirectly facilitating the process of critical thinking carried on by the community of learners. However, when there are affective goals for the educational process, as well as purely cognitive ones, (i.e., where it is important that participants find the interaction in the group enjoyable and personally fulfilling, so that they will remain in the cohort of learners for the duration of the program), then social presence is a direct contributor to the success of the educational experience. This

element of our model is discussed briefly below, and in considerably more detail in Anderson, Rouke,

Garrison & Archer (1999).

The third element of the model, teaching presence, consists of two general functions, which may

be performed by any one participant in a Community of Inquiry; however, in an educational

environment, these functions are likely to be the primary responsibility of a teacher. The first of these

functions is the design of the educational experience. This includes the selection, organization, and

primary presentation of course content as well as the design and development of learning activities and

assessment. A teacher or instructor typically performs this function. The second function, facilitation, is

a responsibility that may be shared among the teacher and some or all of the other participants or

students. This sharing of the facilitation function is appropriate in higher education and common in

computer conferencing. In either case, the element of teaching presence is a means to an end - to

support and enhance social and cognitive presence for the purpose of realizing educational outcomes.

Besides these three basic elements, this research group briefly addresses below and in more detail in

other publications other topics closely related to the Community of Inquiry model. One such topic is the

impact of a shift from spoken language to written language as the central mode of communication in the

educational process, as occurs in the shift to the use of CMC in higher education. The "text-basedness"

of CMC is discussed by Archer, Garrison & Anderson (1999b). A second related topic is the

methodology of research in this area. This topic is treated in Rourke, Anderson, Garrison, & Archer

(1999). Finally, the impact on institutions of higher education of the shift to CMC is discussed briefly

below, and in much more detail in Archer, Garrison, & Anderson (1999a).

Oral and text-Based Communication

Traditionally, educational interactions have been based upon oral communications between and

among teachers and learners. Oral communication tends to be fast-paced, spontaneous, fleeting and less

structured than text-based communication. Notwithstanding what might be considered less than ideal characteristics for disciplined and rigorous thinking, experience has shown that oral critical discourse can facilitate critical thinking – at least in well moderated small seminar groups. Moreover, oral communication in a face-to-face context provides multiple non-verbal or paralinguistic cues such as facial expression and tone of voice. Socially and emotionally, face-to-face oral communication is a rich medium.

In contrast, written communication might be termed a lean medium, in that much of the information that creates and sustains the group dynamic of face-to-face groups is simply not transmitted. When a writing or text-based medium such as computer conferencing is used for educational purposes, questions may arise as to whether this leaning down of the communication channel through the screening out of much non-verbal and paralinguistic communication detracts from the quality of learning. On the other hand, the effects are not necessarily all negative. Compared to traditional, oral classroom interaction, computer conferencing would appear to offer not only potential deficiencies, but also some advantages.

One such advantage is that text-based communication provides time for reflection. For this reason, written communication may actually be preferable to oral communication when the objective is higher-order cognitive learning. Some of the literature does, in fact, suggest that written communication is very closely connected with careful and critical thinking (Applebee, 1984; Fulwiler, 1987; White, 1993). These authors suggest that it is the reflective and explicit nature of the written word that encourages discipline and rigor in our thinking and communicating. In fact, the use of writing may be crucial when the objective is to facilitate thinking about complex issues and deep, meaningful learning. The use of writing as an adjunct means of communication in even face to face learning situations (outlines on whiteboards, overheads, written handouts) lends support to this supposition.

The broad-brush strokes, then, indicate that there is a probable connection between the use of text-based communication and the achievement of higher-order learning objectives. However, a closer focus on the nature of both oral and written communication shows that this connection is far from straightforward. While it is generally true that written communication tends to be both more complex and more explicit than oral communication, as measured by various linguistic indicators, this is just a tendency. Both oral and written language can be used in a great variety of styles. Despite the general tendency noted above, some styles of oral communication are, in fact, more complex and more explicit than some styles of written communication. Chafe and Danielewicz (1987), among others, note the different "uses people make of speaking and writing, and the different effects spoken and written language may have on the way people think" (pp. 83-84).

One of the goals of the broader study, therefore, is to investigate the features of the written language used in computer conferences that seem to promote the achievement of critical thinking. In this objective we will be building on the work of Chafe and Danielewicz (1987), Fulwiler (1987), White (1993), Olson (1994), Haas (1996), Halliday (1987), and Yates (1993), among others.

<u>A Conceptual Framework</u>

Accepting that spoken and written language may have different effects on thinking, it is important to understand the characteristics of written communication that support critical discourse and a worthwhile educational experience. As noted previously, an analysis of the nature and characteristics of spoken and written communication seems to favor, or at least support, the use of written communication for higher-order thinking. However, there is only a limited amount of empirical evidence to suggest that text-based communication used in computer conferencing can, in fact, support and encourage the development and practice of higher-order thinking skills. Moreover, even if it is shown that computer conferencing can facilitate the development of higher-order thinking, much would remain

to be learned with regard to moderating a computer conference in a manner that will facilitate the development of a meaningful and worthwhile educational experience.

It is generally accepted that the social context greatly affects the nature of learning activities and outcomes (Resnick, 1991). More specifically, Lipman (1991) notes the importance of community in higher-order thinking. He sees a community of inquiry as a valuable if not necessary context for an educational experience if critical thinking is to be facilitated and deep learning is to be an outcome. Lipman describes the characteristics of a community of inquiry in terms of questioning, reasoning, connecting, deliberating, challenging, and developing problem-solving techniques. Consistent with this, Ramsden (1988) argues that the opportunity to negotiate meaning, diagnose misconceptions, and challenge accepted beliefs, as in the community of inquiry described by Lipman, is essential for deep and meaningful educational experiences.

Recently, some educational literature has focused upon the premise that a worthwhile learning experience must consider the learner's personal world (reflective and meaning focused) as well as the shared world (collaborative and knowledge focused) associated with a purposeful and structured educational environment. Garrison and Archer (in press) refer to this as a collaborative constructivist perspective on the teaching and learning transaction. This perspective views an educational experience, in its best manifestation, as a collaborative communication process for the purpose of constructing meaningful and worthwhile knowledge. Collaboration is seen as an essential aspect of cognitive development since cognition cannot be separated from the social context. Dewey (1959) observed nearly a century ago "that the educational process has two sides - one psychological and one sociological; and that neither can be subordinated to the other or neglected without evil results following" (p. 20). For Dewey, education is a collaborative reconstruction of experience.

To this point we have identified the cognitive and social elements of a community of inquiry for educational purposes. To complete this picture, we must add one other core element to this community. That is the responsibility to design and integrate the cognitive and social elements for educational purposes. This remaining essential element of an educational community of inquiry is that of teaching presence. All three elements are essential to a critical community of inquiry for educational purposes (see Figure 1). The elements of a community of inquiry can enhance or inhibit the quality of the educational experience and learning outcomes.

The challenge educators face today is creating a community of inquiry in a virtual environment such as computer conferencing. Computer conferencing presents us with the task of creating and supporting the three essential elements of a community of inquiry in an asynchronous, text-based environment – not the most obvious environment for the creation of any type of community. Is it reasonable to think that a text-based, asynchronous environment can be sufficient to support a quality educational transaction and experience? The nature of communication in a computer conference may be collaborative, but it is very different from face-to-face. And since we have so little experience with it as an educational tool, its effect on the quality of learning is less certain.

Certainly there is truth in the view that it is the instructional design and how we use technology to create a learning environment that is paramount in achieving quality learning outcomes (Clark, 1994; Anderson & Garrison, 1995). That is, most technologies, if skillfully employed, are sufficiently robust to meet a wide range of educational needs and and achieve a wide variety of desirable outcomes. However, it is also true that collaboration depends not only upon the skill of the user but also upon the tools used, and that technology "inevitably shapes the way people relate to each other" (Schrage, 1995, p. 137). It may be that different media have different potentials to address cognitive, social and teaching presence.

Theoretically, as has been noted, it would appear that computer conferencing has considerable potential in creating a critical community of learners in support of critical thinking. In the field of distance education, in particular, Garrison (1997) has argued that computer conferencing represents a new era, a post-industrial age of distance education, due to its ability to create a collaborative community of learners asynchronously and in a cost-effective manner. However, computer conferencing can fulfill this great potential in distance and on-campus education only if it includes the three essential elements of a community of inquiry – cognitive presence, social presence, and teaching presence. The following sections examine these elements in turn.

Cognitive Presence

The extent to which cognitive presence is created and sustained in a community of inquiry is partly dependent upon how communication is restricted or encouraged by the medium. There have been few empirical studies of the use of asynchronous, text-based collaborative communication to facilitate deep and meaningful learning in higher education. Among these few, noteworthy is Newman, Johnson, Webb & Cochrane (1996), who studied deep and surface approaches to learning and thinking in face-to-face and computer supported group learning context. The authors developed a content analysis method using the critical thinking model proposed by Garrison (1991). For each phase of the model, Newman and his co-authors created indicators that reflected deep or surface learning approaches. For example, in the exploration phase, positive (deep) indicators would be "welcoming new ideas" or " "linking facts, ideas and notions" and negative (surface) indicators would be "putting down new ideas" or "repeating information without making inferences". Each of the transcripts from face-to-face educational seminars and computer conferences were analyzed by classifying each statement according to the indicators.

Newman, Johnson, Webb & Cochrane (1997) found significant differences between computer conference and face-to-face seminars in critical thinking. More specifically, computer conferencing students more often brought in outside material and linking ideas to solutions while face-to-face students were slightly better at generating new ideas. Consistent with this finding, computer conferencing students were found to be less interactive. Students said less but the level of critical thinking was higher. This raises the question as to whether computer conferencing encourages more convergent, in-depth thinking while face-to-face seminars might seem to facilitate more and divergent (i.e., creative) interaction. These results also point to the need for effective teaching presence, to encourage active discourse and knowledge construction.

The authors conclude that the computer conference students "adopted a more serious, worthier, style when taking part in the computer conferences, as if it were writing an essay, as shown by the higher ratio for important statements" (Newman, et al., 1996, p.62). This finding appears to support our theoretical position regarding the potential for facilitating deep and meaningful learning in a computer conference environment. While such a finding supports the intuitive belief that text-based discourse and computer conferencing has this potential, there appears to be a downside, in that Newman et al. (1997) found that face-to-face seminars seemed to facilitate more creative and higher volumes of interaction.

A revealing study of knowledge construction in a computer conferencing context is provided by Gunawardena, Lowe & Anderson (1997). In this study, the focus was on a large group of distance education professionals in a list-serve debate format. As a result, the findings may be somewhat limited from an educational perspective where a strong facilitator or monitor (usually a teacher) would be present to guide the discussion, diagnose misunderstandings, and negotiate meaning. However, through a grounded theory analysis of the transcripts, an interaction model of computer mediated communication emerged that is not dissimilar to the critical thinking process and, specifically, the Garrison (1991)

model. The five phases of negotiation and knowledge co-construction were; sharing/comparing, dissonance, negotiation, co-construction, testing, and application. Kanuka and Anderson (1998) applied this model of transcript analysis with interesting results showing levels of knowledge construction that were lower than anticipated by the researchers, and also lower than perceived by participants. The authors hypothesized that this was due to the lack of teacher presence in this computer conference.

Bullen (1997, 1998) conducted a study of the facilitation of critical thinking within a formal education context supported by computer conferencing. He completed an extensive evaluation of a single, campus-based university class of 18 full time students. Using questionnaires, quantitative measures of participation, interviews and observations, and an analysis of conferencing transcripts, he attempted to determine factors that "affected student participation and critical thinking" (Bullen, 1997, p. ii). The content analysis of the transcripts consisted of identification of negative and positive indicators of four categories of critical thinking skills as defined by Norris and Ennis (1989). These categories included skills of clarification, assessing evidence, making and judging inferences, and using appropriate strategies and tactics. The outcome of this study revealed serious methodological problems with the analysis of the transcripts. As do most previous studies, this study reported high levels of unreliability among coders. This dissertation also contains no serious discussion of the unit of analysis employed in the study.

All these studies have faced methodological challenges in creating and applying valid indicators that reflect the quality and extent of deep and meaningful approaches to learning facilitated in a computer conferencing environment. The challenge is to choose indicators that are specific enough to be meaningful, but still broad enough to be usable in the actual analysis of transcripts. Furthermore, these indicators must be parsimoniously categorized within the main elements of a community of inquiry such that coherence and meaning are apparent.

As essential as cognitive presence is in an educational transaction, individuals must feel comfortable in relating to each other. Cognitive presence by itself is not sufficient to sustain a critical community of learners. Such an educational community is nurtured within the broader social-emotional environment of the communicative transaction. We hypothesize that high levels of social presence with accompanying high degrees of commitment and participation are necessary for the development of higher-order thinking skills and collaborative work.

Social Presence

Given the reliance of computer conferencing on the written word, the establishment of a community of inquiry can be problematic with regard to establishing social presence. We define social presence as the ability of participants in a community of inquiry to project themselves socially and emotionally, as "real" people (i.e., their full personality), through the medium of communication being used. Unlike earlier communications theorists (Daft & Lengel, 1986; Short, Williams, & Christie, 1976; Sproull & Kiesler, 1986) we do not believe that the effect of media per se is the most salient factor in determining the degree of social presence that participants develop and share through the mediated discourse. Rather, the communication context created through familiarity, skills, motivation, organizational commitment, activities and length of time using the media directly influence the social presence that develops.

We argue that cognitive presence, as defined and described in the previous section, is more easily sustained when a significant degree of social presence has been established (Garrison, 1997; Gunawardena, 1995). That is, socio-emotional interaction and support are important and sometimes essential in realizing meaningful and worthwhile educational outcomes. Social presence in the form of socio-emotional communication is possible in computer mediated communication, but not automatic. Walther (1992) suggests that CMC users adapt their linguistic and textual behaviors to the solicitation

and presentation of socially revealing, relational behavior. Therefore, it would seem that CMC participants could develop compensating strategies when the medium reduces or eliminates visual cues. All communication, including mediated communication, carries the potential for misunderstanding and, therefore, benefits from compensating redundancies.

Fabro & Garrison (1998) found social presence to be crucial to establishing a critical community of learners. However, this does not reveal much about the process that will facilitate worthwhile outcomes. That process is a collaborative process where critical reflection and discourse are encouraged and practiced. Schrage (1995) states that the "act of collaboration is an act of shared creation and/or shared discovery" (p. 4). Collaboration is an approach to teaching and learning that goes beyond simple interaction and declarative instructions. Collaboration must draw learners into a shared experience for the purposes of constructing and confirming meaning. Realizing understanding and creating knowledge is a collaborative process. The difference between collaboration and common information exchange is:

> … the difference between being deeply involved in a conversation and lecturing to a group. The words are different, the tone is different, the attitude is different, and the tools are different. (Schrage, 1995, p. 5)

Reaching beyond transmission of information and establishing a collaborative community of inquiry is essential if students are to make any sense of the often-incomprehensible avalanche of information characterizing much of the educational process and society today. The educational process is largely concerned with being initiated, not only into the common body of knowledge (i.e., public knowledge), but also into the meta-cognitive processes and culture of a discipline or field of study. Here is where collaboration and critical discourse is essential. Collaborative inquiry provides for a qualitative dimension beyond acquiring specific content of a discipline.

Finally, a key aspect of establishing social presence in face-to-face settings is visual cues. When computer conference participants have never met, the lack of visual cues may present particular challenges to establishing social presence. However, Walther (1994) and Kuehn (1993) describe how participants develop techniques such as use of emoticons or other unconventional symbolic displays to add affective components to computer mediated dialogue. If computer conferencing can support collaborative communities of inquiry by using such means to help establish social presence, then it may be an appropriate technology for facilitating higher education despite its restriction to written language.

An awareness of the critical thinking and inquiry dynamic is an essential metacognitive ability that encourages students to approach a problem strategically and actively seek out sources of knowledge, discover biases, sift through the increasingly large quantities of information now available, and formulate and defend their own intellectual positions. We believe it is essential that the process be done in an interactive and social environment. However, it is not always possible for educational transactions to take place in a face-to-face context, nor may this be the only or best context. There is clearly a need to understand how we can create a critical community of inquiry and support worthwhile educational outcomes using mediated communication technologies such as computer conferencing.

Social presence marks a qualitative difference between a collaborative community of inquiry and a simple process of downloading information. The difference is the quality of the message; in a true community of inquiry the tone of the messages is questioning but engaging, expressive but responsive, skeptical but respectful, and challenging but supportive. In such a collaborative community of learners social presence is enhanced. When social presence is combined with appropriate teaching presence, the result can be a high level of cognitive presence leading to fruitful critical inquiry.

Teaching Presence

The binding element in creating a community of inquiry for educational purposes is that of teaching presence. Appropriate cognitive and social presence, and ultimately, the establishment of a critical community of inquiry, is dependent upon the presence of a teacher. This is particularly true if computer conferencing is the primary means of communication for an educational experience. In fact, when education based on computer conferencing fails, it is usually because there has not been responsible teaching presence and appropriate leadership and direction exercised (Gunawardena, 1991; Hiltz & Turoff, 1993).

We believe that, despite the interposing of communication technologies between participants in a community of inquiry, teaching presence can be established and sustained. However, computer conferencing with its distinct combination of attributes (i.e., asynchronous text based communication) presents unique challenges to development of effective teacher presence. The evidence cited previously and our own experience suggest that teaching presence can be created and sustained in computer conferencing environments, despite the absence of non-verbal and paralinguistic cues.

With regard to student activity in a computer conference, Tagg and Dickinson (1993) found that student activity is influenced by tutor behavior. More specifically, they conclude that continual tutor presence characterized by short messages acknowledging a student's contribution and followed by guidance increases student activity. Similarly, in an exploratory study of computer conferencing, interviews and focus groups of students revealed that the established presence of a moderator who models critical discourse and constructively critiques contributions is crucial if higher-order learning outcomes are to be facilitated (Fabro & Garrison, 1998).

The management of the computer conference provides a number of ways by which the teacher can influence the development of cognitive and social presence. These include regulation of the amount of content covered, use of an effective moderation style in discussions, determining group size,

understanding and capitalizing on the medium of communication, and making supplemental use of face-to-face sessions.

Due to the asynchronous nature of the medium, learners are provided time to reflect, then contribute to the discussion after they have formulated their thoughts. If reflection is to be encouraged and the strength of the medium utilized, then the amount of "content must be limited if students are to have the time to critically analyze and construct deep meaning" (Fabro & Garrison, 1998, p. 51). Therefore, discussion topics should last a week or two at the most so as to avoid the buildup of large numbers of postings on the same topic. As in face-to-face seminars, small break-off discussion groups with a small number of participants can be created to provide an opportunity for sustained dialogue on a single topic without producing the excessive numbers of postings that would occur in larger groups.

Another teaching concern is utilizing the collaborative capability of computer conferencing. We have argued that a community of inquiry is important to support critical thinking and meaningful learning in general. While this is generally accepted in face-to-face sessions, it is not so clear how we are to build this community and facilitate critical discussion in an asynchronous text-based environment. Finally, when designing an educational experience supported by computer conferencing, consideration should be given to an initial face-to-face meeting where relationships and a comfort level can be established. This may not be practicable, but it should be employed if possible so that teaching presence can be established and expectations communicated and negotiated.

These are but a few obvious examples of establishing appropriate teaching presence in a higher education computer conference. There is growing recognition of the importance of teaching presence for a successful computer conference – especially when critical thinking and discourse is required. What we do know about structuring and facilitating higher-order learning in a text-based environment is sketchy and largely intuitive. There is little guidance as to the specifics of creating and maintaining a community of

inquiry in a text-based environment. Much work is required on the basics of determining how best to design and conduct a computer conference for purposes of meaningful and worthwhile learning outcomes.

A Template

Researchers are challenged to identify and assess, in the transcripts of computer conferences used for educational purposes, indications of meaningful educational activities in this environment. To meet this challenge researchers require reliable tools (i.e., coding instruments) to analyze written transcripts. In an attempt to contribute to the available stock of reliable tools we have applied the community of inquiry model to the development of a template for the analysis of computer conference transcripts. This template is categorized as a set of indicators of the presence of the three crucial elements of a fruitful community of inquiry. These indicators are grouped into categories, which in turn are positioned under the three elements (see Table 1).

We began the discussion of this template with cognitive presence, one of the three essential elements of a community of inquiry. In the context of this element we outline four categories of indicators. A discussion of each category is followed by brief descriptions of the indicators within that category.

Cognitive presence. The element of cognitive presence in a computer conference can best be understood in the context of a general model of critical thinking. The practical inquiry model presented below is a variation on the critical thinking model originally proposed by Garrison (1991) and more fully described in Garrison and Archer (in press). We propose this model as a starting point for our discussion of cognitive presence because of its generic structure. It also conforms to the limitations of a formal and somewhat inherently contrived educational experience where issues and problems are generally artificially posed by the teacher and then explored and tested vicariously.

Critical thinking or inquiry is seen here as a holistic multi-phased process associated with a triggering event. This triggering event is followed by perception, deliberation, conception, and warranted action. Moreover, we assume an approach where learning how to think is embedded in what to think; that is, it is domain-specific and context-dependent. Critical thinking and inquiry is not purely a reflective process internal to one mind. The model presented here assumes an iterative and reciprocal relationship between the personal and shared worlds. That is, there is a synergy between reflection and communicative action. Critical thinking is the integration of deliberation and action. This reflects the dynamic relationship between personal meaning and shared understanding (i.e., knowledge). Purposeful thinking and acting are essential to the educational process.

The practical inquiry model that guides our analysis is based upon the foundational ideas of Dewey (1933) and his conception of practical inquiry. Dewey's practical form of inquiry included three situations – pre-reflection, reflection and post-reflection. Reflection was the heart of the thinking process but was framed by a perplexing and confused situation initially and a unified or resolved situation at the close.

Figure 2: Practical inquiry model
(Adapted from Garrison et al. 2000, The Internet and Higher Education, 2(2-3), 1-19)
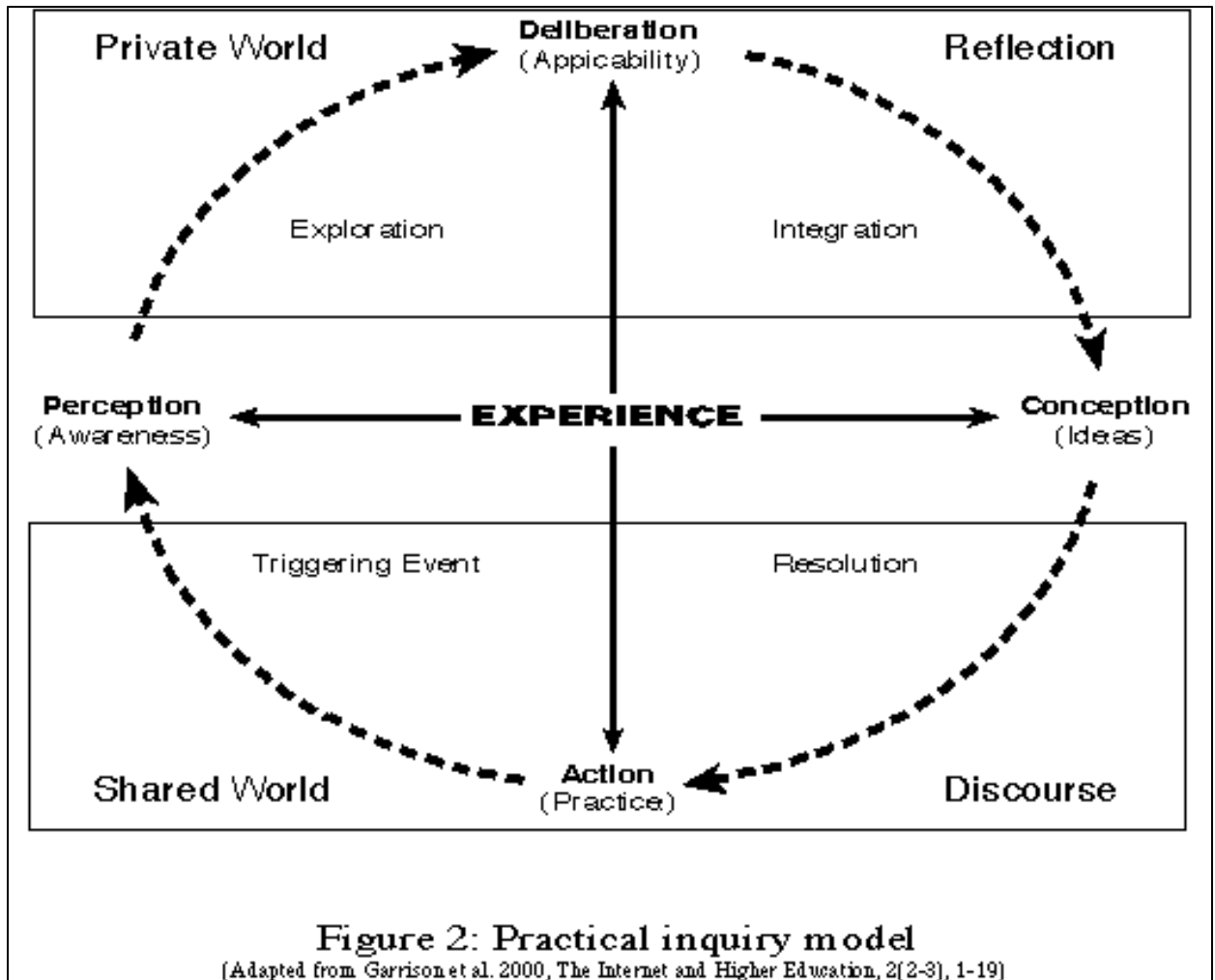
This method of inquiry is based upon experience. It emerges through practice and shapes practice. The product of this inquiry is the resolution of the dilemma or problem and knowledge. A generalized model of Dewey's concept of practical inquiry is represented in Figure 2. The reflective phases of practical inquiry or critical thinking presented here are grounded in the pre- and post-reflective phases of the world of practice. The two axes that structure the model are action-deliberation and perception-conception. The first axis is reflection on practice. The second axis is the assimilation of information and the construction of meaning. Together they constitute the shared and personal worlds. The quadrants reflect the logical or idealized sequence of practical inquiry (i.e., critical thinking) and correspond to the proposed categories of cognitive presence indicators.

The first category of cognitive presence represented in the model (lower left quadrant of Figure 2) is a state of dissonance or feeling of unease resulting from an experience. This category is described as that of a triggering event or communication. The second category (upper left quadrant of Figure 2) is that of exploration in a search for information, knowledge and alternatives that might help to make sense of the situation or problem. This category is described as that of searching for clarification and attempting to orient one's attention. The third category is integrating the information and knowledge into a coherent idea or concept. The description here is looking for insights and gaining some understanding of the acquired information and knowledge. The fourth category is the resolution of the issue or problem. This category is described as an application of an idea or hypothesis. The success of the application and whether the idea is confirmed will determine whether the process of inquiry continues.

Social presence. The three categories of indicators of social presence described here emerged from the literature and were shaped by the community of inquiry model. The categories were refined through an exploratory analysis of a computer conference transcript. The three categories are emotional expression, open communication, and group cohesion.

The first category of social presence indicators is the expression of emotion. Many of the adjectives commonly used to describe emotions are secondary meanings derived from primary meanings related to physical presence – e.g., closeness, warmth, and attraction. The capacity to express these emotions is correspondingly reduced or eliminated when communication is text-based, and taking place at a distance. Kuehn (1993) noted that text-based, asynchronous interlocutors compensate for this loss of physical presence by using unconventional symbolic representations, such as emoticons, to facilitate their expressiveness in the medium. Gunawardena & Zittle (1997) found that conference participants "enhanced their socio-emotional experience by using emoticons to express missing nonverbal cues in written form" (p. 8).

Emotions are inseparably linked to task motivation and persistence, and, therefore, to critical inquiry. In our model, emotional expression is indicated by the ability and confidence to express feelings related to the educational experience. It has been noted that critical thinking is facilitated by the socio-emotional support of others (Brookfield, 1987). Two examples of emotional expression that bring people together in a community are the expression of humor and self-disclosure.

Humor, specifically, has been identified as a contributive factor to social presence and subsequently to learning. Gorham & Christophel (1990) note that humor is like an invitation to start a conversation; it aims at decreasing social distance, and it conveys goodwill. Eggins & Slade (1997) postulate a connection between humor and critical discourse, in that, "the construction of group cohesion frequently involves using conversational strategies such as humorous banter, teasing, and joking. These strategies allow differences between group members to be presented not as serious challenges to the consensus and similarity of the group" (p. 14).

Self-disclosure is another example of emotional expression contributing to the development of social presence among individuals. Cutler (1995) explains that "the more one discloses personal information, the more others will reciprocate, and the more individuals know about each other the more likely they are to establish trust, seek support, and thus find satisfaction (p. 17). Self-disclosure is described as a sharing of feelings, attitudes, experiences and interests. As a result, it encourages others to be more forthcoming and to reciprocate, with the outcome being increased trust, support, and a sense of belonging. Shamp (1991) found that providing CMC users with opportunities for exchange of personal information reduces their feelings of social isolation and allows them to form individualized perceptions of each other.

The second category of indicators of social presence in the template is open communication. The description of open communication is reciprocal and respectful exchanges. Examples of open

communication are mutual awareness and recognition of each other's contributions. Mutual awareness builds group cohesiveness. It begins with evidence that others are present and attending to messages. Issues of self-esteem and impression management are aspects of mutual awareness. Mutual awareness is very much concerned with respectfully attending to the comments and contributions of others..

Mutual awareness helps to shape the learning activities of each participant. Eggins & Slade (1997) suggest that responses and rejoinders (indications of mutual awareness) build and sustain relationships, express a willingness to maintain and prolong contact, and tacitly indicate interpersonal support, encouragement, and acceptance of the initiator. This type of interactive behavior is realized in CMC by using the reply feature to post messages, by quoting directly from the conference transcript, by directing a comment to someone in particular, and by referring explicitly to the content of others' messages. These indicators illustrate respect for individual contributions by the crafting of relevant and constructive comments based upon these prior contributions.

Recognition, the second example of open communication, is the process that fuels the development and maintenance of exchange relationships. While discourse must be open and truth seeking, it must be supportive in acknowledging individual contributions and reacting to specific content of the message. Explicitly expressing appreciation and agreement as well as complimenting and encouraging others are textual tools for communicating recognition and support. This aspect of social presence is particularly important in a text-based environment, where smiles, eye contact, and other non-verbal means of establishing and maintaining social presence through recognition are not available.

The third category of social presence indicators is group cohesion. This category is exemplified by activities that build and sustain a sense of group commitment. This very much supports and is closely associated with the cognitive aspects of an educational experience. The premise is that critical inquiry and the quality of the discourse is facilitated and optimized when students see themselves as part of a

group rather than as individuals. Building cohesion and a sense of belonging is important for sharing

personal meaning. This category might be described as focused collaborative communication that builds

participation and empathy. The importance of this category is revealed by the finding that interaction in

educational computer conferencing is sometimes represented by a series of superficially related

monologues rather than the contextualized and personalized dialogues that are essential to knowledge

construction (Kanuka & Anderson, 1998; Anderson & Kanuka, 1997).

In summary, social presence reflects a supportive context for emotional expression, open

communication and group cohesion for building understanding. Next, we turn to the third crucial element

for establishing and maintaining an educational community of inquiry and successfully integrating

cognitive and social presence in a text-based communication medium.

Teaching presence. Teaching presence is essential in balancing cognitive and social issues

consistent with intended educational outcomes. While these outcomes may well result from the active

leadership of a formally designated teacher, teaching presence goes beyond this individual and may be

provided by any of the participants in a community of inquiry. From a review of the literature and our

own exploratory research, we have tentatively identified three categories of teaching presence

indicators. They are: instructional management, building understanding, and direct instruction.

Instructional management addresses structural concerns such as setting curriculum, designing

methods and assessment, establishing time parameters, and utilizing the medium. This category of

indicators of teaching presence is concerned with planning issues, both before and during the

educational experience. A description of the instructional management category would include reference

to the setting of explicit and implicit structural parameters and organizational guidelines.

Building understanding in an education context is concerned with productive and valid

knowledge acquisition. A process that is challenging and stimulating is crucial to creating and maintaining

a community of inquiry. This category is very much concerned with the academic integrity of a collaborative community of learners. It is a process of creating an effective group consciousness for the purpose of sharing meaning, identifying areas of agreement and disagreement, and generally seeking to reach consensus and understanding. Through active intervention, the teacher draws in less active participants, acknowledges individual contributions, reinforces appropriate contributions, focuses discussion, and generally facilitates an educational transaction.

The last category of indicators of teaching presence is direct instruction. Broadly speaking, this category includes those indicators that assess the discourse and the efficacy of the educational process. Here is where the ultimate "teaching" responsibility, in the best sense of the concept, emerges in the educational process. The teacher's responsibility is to facilitate reflection and discourse by presenting content and proactively guiding and summarizing the discussion as well as confirming understanding through various means of assessment and feedback. The process must provide constructive explanatory feedback. Explanatory feedback becomes crucial when one's ideas are being constructively but critically assessed. Of course, this instructional communication must be perceived within a context of high levels of social presence, or as it is discussed in the classroom environment, high levels of "teacher immediacy" (Sanders & Wiseman, 1990). It requires considerable content expertise, not to mention pedagogical expertise, to make the links among contributed ideas, to diagnose misconceptions, and to inject knowledge from diverse sources such as text-books, published articles, and internet-based resources

Although CMC is not a medium well suited for lecturing or disseminating large blocks of information, teachers do have responsibility for providing contextualized knowledge relevant to the subject domain. This includes providing information from sources beyond the texts and readings,

including personal knowledge derived from the teacher's experiences. Teachers are also responsible for providing remedial or diagnostic feedback to student responses.

Coding. To this point we have described the hypothesized categories of each of the three core elements of a community of inquiry and an educational experience. The next step in the process of developing a reliable analysis tool (i.e., template) was the generation of specific indicators. These indicators were generated to allow for the objective and consistent coding of transcript messages specific to the categories associated with cognitive presence, social presence and teaching presence. The major challenges associated with this concretizing of the model were the vexing problem of determining an appropriate unit of analysis, as well as developing protocols that objectively and reliably code latent processes.

We experimented with several units of analysis, before we settled on units that simultaneously optimize objectivity, reliability, and multiple forms of validity. It should also be noted that different units of analysis might be used to focus on different phenomena within the same study. An in-depth discussion of these issues will be published in Rourke, et al. (1999).

Examples of indicators for cognitive presence corresponding to each of the four phases of critical educational inquiry are: triggering event – recognizing the problem, a sense of puzzlement; exploration – information exchange, discussion of ambiguities; integration – connecting ideas, create solutions; resolution – vicariously apply new ideas, critically assess solutions.

Examples of social presence indicators are: emotional expression – emoticons, autobiographical narratives; open communication – risk-free expression, acknowledging others, being encouraging; group cohesion – encouraging collaboration, helping and supporting;

Examples of teaching presence indicators are: instructional management – structuring content, setting discussion topics, establishing discussion groups; building understanding – sharing personal

meaning/values, expressing agreement, seeking consensus; direct instruction – focusing and pacing

discussion, answering questions, diagnosing misconceptions, summarizing learning outcomes or issues.

Preliminary application of our coding template using the indicators reveal that it is a useful

method for identifying, assessing, and facilitating cognitive, social and teaching presence in

asynchronous, text-based computer conferencing. First, initial assessments of the categories indicate that

they are a valid reflection of the constituent elements of cognitive, social and teaching presence. Second,

the indices have the potential to permit wide use and replication, and thus, a growing base of valuable

information for educators and researchers. In future studies we will continue to verify the coding

template through data gathered from student interviews and surveys.

<u>Conclusion</u>

This research project was situated in the practice of university graduate level programs. The first

phase of this comprehensive study was a thorough review of the communications and distance education

literature focusing on issues of text-based communication. From this review a conceptual framework

and model of a community of inquiry was generated. The model included three core elements for an

educational experience. Next, each of the elements was analyzed and described in terms of their sub-

elements or categories. Finally, indicators were generated for each of the categories corresponding to

the elements (see Table 1). This constituted the template and an essential tool to analyze and code

transcripts from a computer conference. The template is intended to guide research into the optimal use

of computer conferencing as a medium for realizing educational goals in a distributed learning context. In

particular, the template with its elements, categories, and indicators associated with an educational

community of inquiry will be used in future studies to analyze transcripts and code messages in terms of

cognitive, social and teaching presence.

The initial finding of this study is that computer conferencing appears to have considerable potential for creating an educational community of inquiry and mediating critical reflection and discourse (i.e., critical inquiry). However, much work remains to be done before we truly understand how a worthwhile educational experience can be optimally designed and delivered in a text-based environment. Progress in this will depend upon precise and valid categories of indicators associated with each of the three core elements in an educational community of inquiry. We would also expect that this template would be used to assess different educational approaches and strategies in facilitating a community of inquiry in a computer conferencing context.

References

Anderson, T. D., & Garrison, D. R. (1995). Critical thinking in distance education: Developing critical communities in an audio teleconference context. *Higher Education*, *29*, 183-199.

Anderson, T., & Kanuka, H. (1997). On-Line forums: New platforms for professional development and group collaboration. (ERIC Document Reproduction Service No. ED 418693)

Anderson, T. D., Rouke, L., Garrison, D. R., & Archer, W. (1999). *Social presence in computer conferencing: Chewing the phat(ic).* Unpublished paper.

Applebee, A. N. (1984). Writing and reasoning. *Review of Educational Research, 54*, 577-596.

Archer, W., Garrison, D.R., & Anderson, T. (1999a). Adopting disruptive technologies in traditional universities: Continuing education as an incubator for innovation. *Canadian Journal for University Continuing Education, 25*(1), 13-30.

Archer, W., Garrison, D.R., & Anderson, T. (1999b) *The textuality of computer mediated communication: Consequences for the use of CMC in education*. Unpublished Manuscript.

Brookfield, S. D. (1987). *Developing critical thinkers*. San Francisco: Jossey-Bass.

Bullen, M. (1997*). A case study of participation and critical thinking in a university-level course delivered by computer conferencing*. Unpublished doctoral dissertation. University of British Columbia, Vancouver, Canada.

Bullen, M. (1998). Participation and critical thinking in online university distance education. *Journal of Distance Education, 13*(2), 1-32.

Chafe, W., & Danielewicz, J. (1987). Properties of spoken and written language. In R. Horowitz & S. J. Samuels (Eds.), *Comprehending oral and written language* (pp. 83-113). San Diego: Academic Press, Inc.

Clark, R.E. (1994). Media will never influence learning. *Educational Technology Research and Development, 42*(2), 21-29.

Cutler, R. (1995). Distributed presence and community in cyberspace. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century, 3*(2), 12-32. Available [Online]: http://jan.ucc.nau.edu/~ipct-j/1995/n2/cutler.txt

Daft, R. L., & Lengel, R. H. (1986). *Organizational information requirements, media richness, and structural determinants.* Management Science, 32, pp. 554-571.

Dewey, J. (1933*). How we think* (rev. ed.). Boston: D.C. Heath.

Dewey, J. (1959). My pedagogic creed. In J. Dewey, *Dewey on education* (pp. 19-32). New York: Teachers College, Columbia University. (Original work published 1897)

Eggins, S., & Slade, D. (1997). *Analyzing casual conversation.* Washington: Cassell.

Fabro, K. R., & Garrison, D. R. (1998). *Computer conferencing and higher-order learning. Indian Journal of Open Learning, 7(1),* 41-54.

Fulwiler, T. (1987). *Teaching with writing.* Portsmouth, NH: Heinemann.

Garrison, D. R. (1991). Critical thinking and adult education: A conceptual model for developing critical thinking in adult learners. *International Journal of Lifelong Education, 10*(4), 287-303.

Garrison, D. R. (1997). Computer conferencing: The post-industrial age of distance education. *Open Learning, 12*(2), 3-11.

Garrison, D. R., & Archer, W. (in press). *A transactional perspective on teaching and learning: A framework for adult and higher education.* Oxford, UK: Pergamon.

Gorham, J., & Christophel, D. (1990). The relationship of teachers' use of humor in the classroom to immediacy and student learning. *Communication Education*, *39*(1), 46-62.

Gunawardena, C.N. (1991). Collaborative learning and group dynamics in computer-mediated communication networks. *Research Monograph of the American Center for the Study of Distance Education (No. 9) 14-24.* University Park, Pennsylvania: The Pennsylvania State University

Gunawardena, C. N. (1995). *Social presence theory and implications for interaction and collaborative learning in computer conferences*. Paper presented at the Fourth International Conference on Computer Assisted Instruction. Hsinchu, Taiwan. March, 1995.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*, 395-429.

Gunawardena, C. N., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8-26.

Haas, C. (1996). *Writing technology: Studies on the materiality of literacy*. Manwah, N.J.: Erlbaum.

Halliday, M.A.K. (1987). Spoken and written modes of meaning. In R. Horowitz & S. J. Samuels (Eds*.), Comprehending oral and written language* (pp. 55-82). San Diego: Academic Press.

Hiltz, S. R., & Turoff, M. (1993). *The network nation: Human communication via computer*. Cambridge, MA: MIT Press.

Kanuka, H., & Anderson, T. (1998). On-line social interchange, discord and knowledge construction. *Journal of Distance Education. 13*(1) 57-74.

Kuehn, S. (1993). Communication innovation on a BBS: A content analysis. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century, 1*(2). Available [Online]: http://jan.ucc.nau.edu/~ipct-j/1993/n2/kuehn.txt

Lipman, M. (1991). *Thinking in education*. Canbridge: Cambridge University Press.

Newman, D. R., 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: An Electronic Journal for the 21st Century, 4*(1), 57 - 74. Available [Online]: http://www.helsinki.fi/science/optek/1996/n1/newman.txt

Newman, D. R., Webb, B., & Cochrane, C. (1997). Evaluating the quality of learning in computer supported co-operative learning. *Journal of the American Society for Information Science, 48*(6), 484-495.

Norris, S. P., & Ennis, R. H. (1989). *Evaluating critical thinking*. Pacific Grove, CA: Critical Thinking Press.

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). A review of methodological issues in analyzing text-based computer conferencing transcripts. Unpublished manuscript.

Ramsden, P. (Ed.). (1988*). Improving learning: New perspectives*.   London: Kogan Page.

Resnick, L. B. (1991). Shared cognition: Thinking as social practice. In Resnick, L. B., Levine, J. M., & Teasley, S.D. (Eds*.), Perspectives on socially shared cognition* (pp. 1-20). Washington, DC: American Psychological Association.

Sanders, J., & Wiseman R. (1990). The effects of verbal and nonverbal teacher immediacy on perceived cognitive, affective and behavioral learning in the multicultural classroom. *Communication Education, 39,* 341-353.

Schrage, M. (1995). *No more teams!: Mastering the dynamics of creative collaboration.* New York: Currency Doubleday.

Shamp, Scott (1991). Mechanomorphism in perception of computer communication partners. *Computers in Human Behavior. 7*(3), 147-61.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunication*. London: John Wiley.

Sproull, L., & Kiesler S. (1986). Reducing social context cues. Electronic mail in organizational communication. *Management Science, 32*, 1492-1512.

Tagg, A. C., & Dickenson, J. A. (1995). Tutor messaging and its effectiveness in encouraging student participation on computer conferences. *Journal of Distance Education, 10(2)*, 33-55.

Walther, J. (1992). Interpersonal effects in computer mediated interaction: A relational perspective. *Communication Research, 19*(1), 52-90.

Walther, J. B. (1994). Anticipated ongoing interaction versus channel effects on relational communication in computer-mediated interaction. *Human Communication Research, 20*, 473-501.

White, E. M. (1993). Assessing higher-order thinking and communication skills in college graduates through writing. *The Journal of General Education, 42*, 105-122.

Yates, S.J. (1993). *The textuality of computer-mediated communication: Speech, writing, and genre in CMC discourse*. Unpublished Ph.D. dissertation, Centre for Information Technology in Education, Institute of Educational Technology, Open University (UK).