

Threaded Discussion

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Threaded discussion is a kind of *computer-mediated communication* (CMC). Specifically, it is an online dialog or conversation that takes the form of a series of linked messages organized topically. Threaded discussions are text-based and asynchronous; they develop over time as participants separated in time and space read and reply to existing messages. Messages in a given thread share a common topic and are linked to each other in the order of their creation. Threaded discussions are particularly useful in online venues where multiple discussions develop at the same time. They grow like crystals, with multiple threads expanding simultaneously rather than evolving linearly. Without them, discussion participants would confront a chaotic, unsorted list of messages on many different topics. By linking responses to messages within a common subject line, threaded discussion makes it easier for participants to focus on one conversation and avoid the distractions of unrelated postings.

Threaded discussions are also significantly different from face-to-face discussions, beyond the simple aspects of their form. To begin with, all students have a voice in threaded discussion and no one can dominate the conversation. The asynchronous nature of the discussion also makes it impossible for even an instructor to control. Accordingly, many educators note that students perceive online discussion as more equitable and more democratic than traditional classroom discussions (Harasim, 1990; Levin, Kim & Riel, 1990; Eastmond, 1995). In addition, because it is asynchronous, threaded discussion affords participants the opportunity to reflect on their classmates' contributions while creating their own, and on their own writing before posting them. This tends to create a certain mindfulness among students and a culture of reflection in an online course (Hiltz, 1994; Poole, 2000; Garrison, 2003). Finally, despite the fact that it is text-based and so lacking in visual and verbal cues, most participants find it strangely personal (Gunawardena & Zittle, 1997); indeed Joe Walther (1994) has called it "hyperpersonal." Because it so appears to be a unique feature of online learning, threaded discussion has attracted the attention of researchers and practitioners since its infancy as a kind of computer-mediated communication (CMC). One way to think about threaded discussion is to conceptualize it within a framework adapted from the work of several seminal theorists of online learning.

We begin with Michael Moore (1989) who identified three kinds of interactions that support learning in general, but that are particularly important to implement online -- interaction with course content, interaction with instructors, and interaction with classmates. These have proved useful constructs for thinking about online learning up to the present. *Interaction with content* refers to learners' interaction with the knowledge, skills and attitudes being studied. *Interaction with instructors* includes the myriad ways instructors teach, guide, correct, and support learners. *Interaction with classmates* refers to interactions among learners, such as through debate, collaboration, discussion, and peer review, as well as the informal and incidental learning that typically accompanies formal classes. In 1994, Hillman, Willis, and Gunawardena noted the importance of a fourth type of interaction, *interaction with interface*, which they defined as the interaction that takes place between a student and the technology used to mediate a particular distance education process.

In 1999, Garrison, Anderson, and Archer, who were particularly interested in online discussions and which they conceptualized as communities of inquiry, developed a model which situated learning in threaded discussion at the intersection of three kinds of presence manifest within them which roughly equate with the three kinds of interactions conceptualized by Moore. *Cognitive presence* is the extent to which participants are able to construct meaning through sustained communication. *Teaching presence* includes subject matter expertise, the design and management of learning, and the facilitation of active

learning. *Social presence* is the perceived presence of others in mediated communication, which Garrison, et al. contend, supports both cognitive and teaching presence through its ability to instigate, sustain, and support interaction. What Garrison, et al.’s model added to Moore’s conceptualization is a functional approach which focuses on the nature of interactions, and the notion of overlapping spheres of influence concerning them. That is, they realized that within threaded discussion, all participants share responsibility for presenting concepts and ideas, for supporting learning, and for developing the social community within which learning takes place.

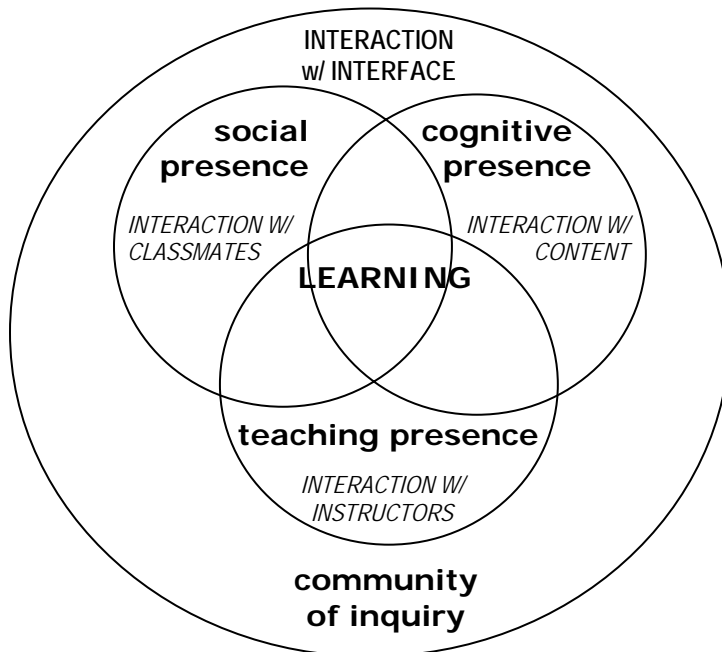


Figure 1: Factors Affecting Learning Online; Swan, 2003

Putting these all together, we have the model of online learning in general, and learning within threaded discussions in particular, shown in Figure 1. The model, borrowing from the community of inquiry model (Garrison, et al., 1994) places learning at the interface of interactions with course content, instructors, and classmates (Moore, 1989), and at the center of the three kinds of presence which support online discussion – cognitive, teaching, and social. It further conceives all of these interactions as mediated through the online interface (Hillman, et al., 1994). In the sections which follow, what we know and what we need to know about threaded discussions will be reviewed through the lenses of each of the subcomponents of this model. I will do this in a somewhat reverse order (beginning with social presence and ending with interface issues), because that is the way research in the field has evolved historically.

Social Presence

Social presence can be defined as the perceived salience of others in online discussions. Research on it is directly related to research on immediacy in traditional classrooms. Indeed, there is a considerable body of research on face-to-face teaching and learning which suggests that teacher immediacy behaviors can significantly affect student learning (Gorham, 1988, Christophel, 1990; Richmond, 1990; Rodriguez, Plax & Kearney, 1996). “Immediacy” refers to behaviors that lessen the “psychological distance between communicators” (Weiner & Mehrabian, 1968, p. 17). Educational researchers have found that teachers’ verbal (ie., giving praise, soliciting viewpoints, humor, self-

disclosure) and non-verbal (ie., physical proximity, touch, eye-contact, facial expressions, gestures) immediacy behaviors lead, directly or indirectly, depending on the study, to greater learning.

This research has important implications for online learning. Social Presence theory (Short, Williams & Chrisite, 1976), Media Richness theory (Rice, 1992), and Picard's (1997) more recent notion of Affective Channel Capacity argue that differing media have differing capacities to transmit the non-verbal and vocal cues that produce feelings of immediacy in face-to-face communications, and so have questioned the capacity of some media, threaded discussion in particular, to promote learning. The argument is that low bandwidth media transmit low social presence, and so cannot convey the social support necessary to sustain learning.

Researchers experienced with online teaching and learning, however, contest this view. What is important, they contend, is not media capabilities, but rather personal perceptions (Walther, 1994, Gunawardena & Zittle, 1997; Poole, 2000; Rourke, Anderson, Garrison & Archer, 2001). Of course, in online discussions the role of instructors often shifts from discussion leaders to discussion facilitators, and students commonly assume more responsibility (Poole, 2000; Coppola, Hiltz & Rotter, 2001). Recent studies have moreover demonstrated that, however changed, instructor participation in threaded discussion is critical to the development of social presence (Shea, Li, Swan, & Pickett, 2005; Swan & Shih, 2005) and sometimes not fully appreciated by online faculty (Liu, Bonk, Magjuka, Lee, & Su, 2005). None-the-less, research on social presence in online environments has accordingly concerned itself with the immediacy behaviors of all discussion participants.

Gunawardena and Zittle (1997), for example, developed a survey to explore student perceptions of social presence in computer-mediated conferences associated with a Global Education course. In two separate studies, they found that students rated asynchronous discussion as highly interactive and social. The researchers concluded that course participants created social presence by projecting their identities online and building a discourse community among themselves. What was important, they argued, was student perceptions of the presence of others, not the medium's capacity to capture gestures and intonations. Richardson and Swan's (2003) research, using a survey adapted from Gunawardena & Zittle, replicated and extended these findings. They found that students' overall perception of social presence was a predictor of their perceived learning in seventeen different online courses. Picciano (2002) reports similar findings.

To account for such findings, Danchak, Walther, and Swan (2001) argue for an equilibrium model of the development of social presence in mediated environments. Equilibrium, in this sense, refers to an expected level of interaction in communications (Argyle & Cook, 1976). When communicative equilibrium is disrupted, research shows that communication participants work to restore it. In this case, when fewer affective communication channels are available to transmit immediacy via conventional vocal and non-verbal cues, it is argued, participants in mediated communications increase their verbal immediacy behaviors to the extent needed to preserve a sense of presence. Content analyses of online discourse support such a model. Swan (2001), for example, not only found high levels of verbal immediacy behaviors in online discussion, supporting an equilibrium model, but interesting patterns in the use of these behaviors over the course of an online class. Most striking in this analysis was an increase in the use of interactive responses and a decrease in the use of cohesive responses over time, which she attributes to changing social presence needs as a course evolves. Recent work by Swan & Shih (2005), moreover, discovered that participants perceiving the highest levels of social presence in threaded discussion also exhibited significantly more verbal immediacy behaviors in their responses, linking perception with presentation of social presence.

Virtual Learning Communities

The research on social presence suggest that threaded discussion in online courses might well be understood and investigated in terms of the development of communities of practice (Wenger, 1997); indeed, most such course discussions can be shown to exhibit mutual engagement, joint enterprise, a shared repertoire, and negotiated meanings. Wegerif (1998) specifically likened success in online courses to induction into a community of practice. He found that the individual success or failure of students enrolled in an online course at the Open University depended on their ability to cross a threshold “from feeling like outsiders to feeling like insiders” (p 34) in that community. Many researchers, in fact, assume a link between social presence or social interaction and the development of learning communities (Rheingold, 1993; Poole, 2000; Russell & Daugherty, 2001; Swan, 2001; Caverly & MacDonald, 2002; Walther & Boyd, 2002); that is they use evidence of social interaction and support to demonstrate the development of community.

Other researchers directly explore the development of virtual communities and identify conditions or factors supporting that process. Coppola, Hiltz and Rotter (2002), for example, found that the development of successful online collaborative teams was related to their ability to develop “swift trust” in the initial weeks of a course on information systems. Norris, Bronack and Heaton (2000) identified several factors contributing to the development of learning communities in online education courses -- the intended consequences of the discussion must be made explicit and agreed upon; online discourse must be convenient, familiar, accessible, meaningful, and focused; and sufficient regard must be given to environmental, social, and motivational factors that sustain online discussion and move it forward.

Ruth Brown (2001) studied the processes through which community was formed in threaded discussion through repeated interviews with a theoretical sampling of students from three online courses. Brown identified three levels or stages in the development of feelings of belonging to a class community – making acquaintances, community conferment, and camaraderie. Brown also delineated preconditions necessary to the development of community and argued that her findings suggest ways in which the development of community can be supported by online course developers and facilitators.

Such argument is echoed in the work of Alfred Rovai (2002) who developed the Sense of Classroom Community Index (SCCI) to measure students’ sense of community in both traditional and online classes. Comparing the two, Rovai found much greater variability among online classes. This finding suggests that, while a sense of community in some sense grows naturally out of the common experience of being in face-to-face classes, it may need more conscious support in online environments. Indeed, a recent large-scale study by Shea, et al. (2005) links sense of community in online classes, as measured on the SCCE, to instructor behaviors understood as teaching presence. Other research links collaborative activity to its assessment (Swan, Shen, & Hiltz, 2006).

Cultural Considerations

A final issue that should be mentioned in any discussion of social presence and virtual community in threaded discussions is that of the potential effects of culture on both the perception and presentation of social presence. This issue is particularly important as online education becomes increasingly international and global. At first glance, it would seem that threaded discussion is a tremendous vehicle for bridging cultures. Not only can it bring together people separated in time and space, but its text-based nature obscures physical and vocal cues that might lead to stereotyping. Indeed Gunawardena and Zittle (1997) early work on Global studies suggests the immense potential of the medium. However, there has been some more recent work that suggests that different cultures may approach communication differently.

For example, Ken Morse's (2003) exploratory study in this area is based on a characterization of learners that may prove useful for both research and practice. Morse characterizes cultures, according to Hall (1977) as falling along a continuum running from low to high context. In low context cultures, low levels of mutually understood information provide communication context, therefore, communication requires a large amount of explicit information to convey meaning. In high context cultures, high levels of mutually understood information provide context and listeners do not need to be given much background information. Western cultures tend to be low context. Eastern cultures tend to be high context. Morse explored the effects of such differences on student perceptions of threaded discussion. His findings suggest that "the perceptions are based on learning patterns which are developed as part of a participants' ethnic/cultural development, and are potentially challenged by participation in an asynchronous communication network, which of itself is implicitly culturally based." (p 51) He argues that greater awareness of such differences might lead to better communication for all participants. The point is well-taken. Further research in this area is clearly needed.

Teaching Presence

As previously noted, the research from which work on social presence in online discussion evolved was concerned with teacher immediacy. In the online learning arena, the social presence of instructors and their teaching presence are often confounded. Indeed, Swan and Shih (2005) used separate survey items to partial out perceived social presence of instructors from perceived social presence of other students and found that the perceived social presence of instructors was a stronger predictor of perceived learning and satisfaction. Indeed, there is a considerable body of literature which documents the critical importance of interactions with instructors and/or tutors in threaded discussion.

Ruberg, Moore and Taylor (1996), for example, found that for online discussion to be successful, it required a social environment that encouraged peer interaction facilitated by instructor structuring and support. Shea, Fredericksen, Pickett, Pelz & Swan (2001) found significant differences in perceived learning among students interacting with their instructors at differing perceived levels. Students who reported low levels of interaction with their instructors also reported the lowest levels of learning. Conversely, students who reported high levels of interaction with their instructors also reported higher levels of learning from them. Swan, Shea, Fredericksen, Pickett, Pelz & Maher (2000) found a strong correlation between student perceptions of learning and their perceived interactions with instructors. Richardson and Swan (2003) similarly reported a significant correlation between student satisfaction with their instructors and their perceived learning online, and Jiang and Ting (2000) found correlations between perceived interactions with instructors and perceived learning.

Jiang and Ting (2000) further reported that both perceived learning and perceived interaction with instructors were linked to the actual average numbers of responses per student that instructors made. Swan, et al. (2000) also found a weak correlation between students' perceived interaction with their instructors and the actual frequency of instructor interaction in online course discussions. Picciano (1998) likewise found that instructors' activity was related to students' perceived learning in an online graduate level course in educational administration.

A note of caution is in order, however. In a case study of the development of an interpretive community in an online graduate course on gender and culture in children's literature, Kay Vandergrift (2002, p 76) develops the concept of "restrained presence" and its importance in the development of community. Vandergrift describes restrained presence as the instructor's refraining from comment in

discussion to let students find and voice their opinions. She writes, “A faculty role that balances restraint and presence seems to encourage students to make the online class their own.” (p 83)

Anderson & Rourke (2001) have termed instructors' ability to project themselves in online courses *teaching presence*, which they define as "the design, facilitation and direction of cognitive and social processes for the purpose of realizing [students'] personally meaningful and educationally worthwhile outcomes." (p 5) They conceive of teaching presence as composed of three categories of activities roughly analogous to those defined by Berge (1995), Paulson (1995) and Rossman (1999) -- design and organization, facilitating discourse, and direct instruction -- and have created protocols to measure teaching presence in terms of these categories through the content analysis of thematic units in online discussions.

An ongoing study at the SUNY Learning Network (SLN) provides substantial evidence of the focal relationship between teaching presence and student satisfaction with and perceived learning from threaded discussion (Shea, Pickett & Pelz, 2003). Basing their studies directly on the categories and subcategories of teaching presence identified by Anderson & Rourke (2001), SLN researchers used end-of-term survey data to explore correlations between students' perceptions of teaching presence and their satisfaction and perceived learning from online courses. The authors found significant correlations between all measures of teaching presence, both that of the teaching presence of their instructors, and, interestingly, that of their fellow students, and students' satisfaction with and perceived learning from online courses, providing evidence of the overlapping domains in the conceptual model which opened this article. Indeed, in a follow-up study, Shea, et al. (2005) found significant correlations between student perceptions of teaching presence and their sense of online community itself.

Cognitive Presence

We know that interactions between and among instructors and learners, that social presence and teaching presence, however conceived, strongly influence the interactivity of threaded discussions. As Eastmond (1995) reminds us, however, computer-mediated communication is not inherently interactive, but depends on the frequency, timeliness, and nature of the messages posted. Hawisher and Pemberton (1997), for example, relate the success of the online courses they reviewed to the amount of discussion required in them. Picciano (1998) likewise found that students' perceived learning from online courses was related to the amount of discussion actually taking place in them. Similarly, Swan, et al. (2000) discovered a strong correlation between students' perceptions of their interactions with peers and the actual frequency of interactions, the required frequency of student participation, and the average length of discussion responses. What is less certain is whether and what students actually learn from threaded discussion. That is, although scholars note the potential of threaded discussion to encourage critical thinking (Garrison, 2003), it is difficult to identify in discussion transcripts.

Several researchers have none-the-less made the attempt through content analyses of threaded discussion transcripts. Henri (1992), for example, developed five parameters with multiple identifiers for analyzing discussion transcripts, two of which, cognitive and metacognitive, describe phases of critical thinking in threaded discussion. Gunawardena, Lowe and Anderson's (1997) Interaction Analysis Model identifies five phases of knowledge construction – sharing/comparing, discovering/exploring, synthesis, testing, and proofs. Similarly, Garrison, et al. (1999) developed protocols for assessing critical inquiry in threaded discussion in terms of four phases of inquiry – triggering events, exploration, integration, and resolution. What is common across the application of these protocols, however, is that they all seem to find the majority of messages in threaded discussion belonging to the lower levels of critical thinking

delineated. That is, the content analyses performed using these protocols typically show only low levels of critical thinking evolving through threaded discussion.

There are several possible explanations for such findings. One is that what goes on in threaded discussions involves the kinds of exploratory, divergent thinking that precede synthesis, but that this sets the stage for synthesis in other online course activities. An interesting study by Picciano (2002), for example, found significantly higher quality essays produced by students who participated the most in threaded discussions. Another explanation is that we may not be structuring threaded discussion to elicit the kinds of critical thinking such protocols measure. In this vein, a recent study by Aviv, Erlich, Ravid and Geva (2003) compared structured and unstructured online discussions and found higher levels of critical thinking (as measured by the Interaction Analysis Model (Gunawardena, et al., 1997) in the structured discussion.

Finally, Leah Sutton (2001) argues that direct participation in online discussion is not necessary for all students all of the time; that those who actively observe and process both sides of direct interactions among others will benefit from that process which she calls "vicarious interaction". In a pilot study of student interaction in threaded discussion, Sutton identified four different types of interactors that emerged from her data -- direct interactors; vicarious interactors; actors, students who provided unilateral input regardless of the reactions or comments of others; and non-actors. Sutton argues that students learn almost as much from vicarious interaction as from direct interaction, and more than from either action or non-action, by relating her findings to Bandura's (1986) theory of observational learning. Thus it may be that students are thinking critically in response to threaded discussion, we just can't see it.

Interface Issues

Although interface has been shown to have important effects on learning in online environments (Mayer, 2001), little research has explored the effects of interface on threaded discussion. This is perhaps because most course platforms have a common way of representing threaded discussion that we may have taken for granted; namely, they present messages in a thread by their subject lines in a list format with the vertical dimension representing time and the horizontal dimension representing relationships among messages. Most interfaces also mark messages as read or unread and present the text of each message separately. Particularly compelling recent research by Jim Hewitt (2003) suggests, however, that this presentation of threaded discussion results in specific patterns of interactivity that may not be optimal.

Hewitt explored interactivity patterns in 673 multi-message threads found in the online discussions of 92 graduate students enrolled in five asynchronous online courses. For example, there were 344 four message threads in the discussions Hewitt sampled. In a four message thread, there are six possible patterns (Figure 2; numbers indicate sequence in time, indentations indicate responses to a previous posting). One might expect a reasonably equal distribution of these patterns across the sample, yet he found nearly three times as many instances of the elongated pattern (F) as any of the others, and few instances of both the truncated pattern (A) and the sequence that was out of temporal order (E). He found similar frequencies of patterns in the other (longer and shorter) threads in the sample.

Hewitt (2003) attributed these disparities to students' habits of participation in online discussions, habits he maintains are encouraged by the design of discussion interfaces to flag unread notes. Indeed, when he investigated user logs, he found that most students (97.6%) read messages before they posted messages, read only messages flagged as unread (82%), and tended to respond to messages that were less than 48 hours old (80%). He concluded that patterns of interactivity in threaded discussion are clearly influenced by interfaces that flag messages as unread and only display a single message at a time to favor discussions

he characterizes as growing like forest fires, at the edges. The problem with this, he observes, is that potentially interesting and important threads are unintentionally abandoned, and that unintentional changes in topic supplant central themes, resulting in disjointedness and discussions that are often peripheral to course content.

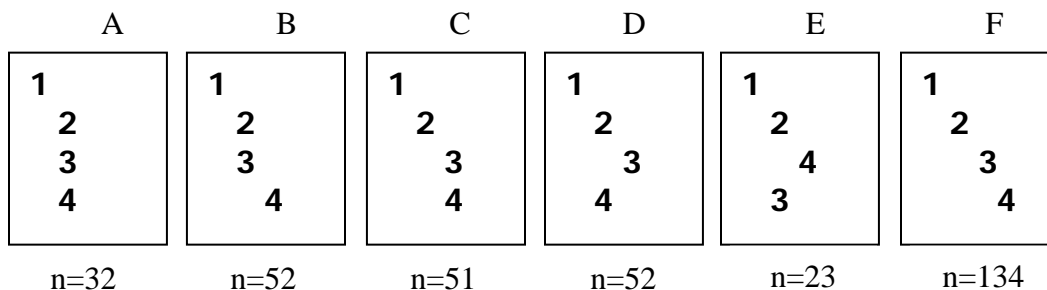


Figure 2: Patterns of Interaction in Threaded Discussion; adapted from Hewitt, 2003

Hewitt’s results demonstrate the powerful mediating effects of interface design on learning through threaded course discussions, and clearly deserve further investigation.

Conclusion

In this overview, I presented a model for thinking about threaded discussion in terms of issues of social presence (interactions with classmates), teaching presence (interactions with instructors), cognitive presence (interactions with course content), and interactions with course interfaces. It is clear from this review that while we have learned a lot about threaded discussion, we still have a lot to learn. Further research in this area is clearly indicated, especially research involving the intersections of the different sorts of interactions identified in the model. In that vein, a recent theory-to-practice overview on principles of online collaboration by Randy Garrison (2006) presents an interesting framework that nests ideas for developing both social and cognitive presence within the three categories of teaching presence. It builds on both community of inquiry theory and recent research and may help to guide future research.

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Terms and Definitions

Cognitive Presence: The extent to which discussion participants are able to construct meaning through sustained communication

Computer-Mediated Communication (CMC): Communication that takes place through, or is facilitated by, computers. Examples include both asynchronous tools such as bulletin boards, email, and threaded discussion and synchronous tools such as chat and video conferencing.

Interaction with Classmates: Interactions among learners through debate, collaboration, discussion, peer review, as well as informal and incidental learning among classmates

Interaction with Content: The learners' interaction with the knowledge, skills and attitudes being studied

Interaction with Instructors: The myriad ways in which instructors teach, guide, correct, and support their students by interacting with them

Social Presence: The perceived presence or salience of others in online discussion

Teaching Presence: The design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile outcomes

Threaded Discussion: An asynchronous online dialog or conversation that takes the form of a series of linked messages organized around a common subject or theme

Virtual Learning Community: a community of people who come together online to learn a particular subject matter