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Towards a theoretical framework for the design of interactive online distance learning systems

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Abstract

This paper sought to provide a theoretical framework for the design of an interactive, online distance learning system that would enhance interpersonal communication, information exchange, and student learning. The paper argues that the theory of hyperpersonal online communication (Walther, 1996, 1997, 2001) and its theoretical predecessor, social information processing theory (Walther, 1992a, 1992b), both provide a strong framework capable of guiding the development of such an online learning system. Research findings from the field of computer-mediated communication are used to demonstrate the usefulness of these two frameworks.

Introduction

Designing systems informed by current research

With the advent of ever more sophisticated communication technologies, there is an increasing desire to incorporate these new technologies into the distance education classroom. Although new communication tools have already been adopted by many distance learning programs, few of them were developed based on a theoretical framework that could have informed their design. All too often new technologies are incorporated into the distance education program without including a careful evaluation of

the relevant theories and research in the planning process. If technology is supposed to improve students' learning however, much more attention needs to be devoted to this planning process (Elmore & Jafari, 1995). Indeed, as Elmore and Jafari (1995) note, "projects are too often initiated without adequately addressing the conceptual and system design issues" (p. 30). This reluctance to let research inform system design can be observed throughout the distance education literature. In their guide to the use of conferencing technologies in distance education classrooms, Burge and Roberts (1993) outline six steps, which the planning and design process should follow. None of the steps advocated by these authors, however, suggests consulting the research on the use of conferencing tools in an effort to inform the system design. While Burge and Roberts (1993) make some valid points about the necessity of determining learning needs and designing learning objectives, they fail to incorporate theory as an integral part of the planning and design process. Eastmond (1995) identifies this atheoretical position as a major limitation in the practice of online distance education.

What is needed then, is a distance online learning system that is based on a theoretical framework able to inform its design. This paper will demonstrate how the theory of hyperpersonal online communication (Walther, 1996, 1997, 2001) and its theoretical predecessor, social information processing theory (Walther, 1992a, 1992b), can be used as a framework to guide the development of an online learning system designed to enhance interpersonal communication, information exchange, and student learning. Before discussing the implications of basing the system design on this theory, it is first necessary to provide a brief synopsis of both theories and explain the main assumptions underlying them.

The Theory of Electronic Hyperpersonal Communication

Findings from early research on computer-mediated communication (CMC) often concluded that because of its reduced cue nature, the online medium encourages highly impersonal communication (Hiltz, Johnson, & Turoff, 1986; Rice, 1984). Since the online medium cannot easily transmit nonverbal or relational cues, this limitation of the medium was usually invoked to explain the impersonal communication that researchers observed in computer-mediated interactions. Culnan and Markus (1987) referred to this explanation as the "cues-filtered-out" perspective. As Walther (1992, 1996) has pointed out however, the conclusion that CMC is an impersonal medium because it can only provide few, if any,

nonverbal and relational cues, might be misleading. Rejecting the cues-filtered-out perspective, Walther (1992) instead argued for a social information processing approach to the study of online communication.

Social information processing theory (SIP) is based on the following three assumptions: (1) "communicators are motivated to develop impressions and relations despite hindrances that alternative media may impose", (2) "users adapt their efforts to present and acquire social information to whatever cue systems a medium provides," and (3) " relational processes take time, and CMC is relatively slower than face-to-face (FTFT) communication" (Walther & Tidwell, 2001, p. 7). The key variable in social information processing theory is time. According to Walther (1992), the findings of impersonal communication reported in early CMC studies, may be more accurately explained by time constraints facing online communicators than a lack of cues available to them. Since social information cannot be easily transmitted through the online medium and needs to be communicated in writing, CMC groups take longer to communicate and can therefore be expected to require more time to develop relationships and reach an interpersonal communication stage. Social information processing theory (Walther, 1992) assumes that CMC users, just like face-to-face communicators, are motivated to develop social relationships, but that they simply need more time to do so. One-shot studies that examine limited-time interactions between CMC users are therefore likely to conclude that CMC is inherently impersonal.

If given enough time, CMC users should be able to exchange sufficient social and task-related information to develop interpersonal relationships and avoid impersonal communication. Due to the limited number of cues capable of being transmitted, "the medium cannot convey all the task-related as well as social information in as little time as multichannel FtF communication" (Walther, Anderson, & Park, 1994, p. 465) and therefore slows down the process of relational development. While social information processing theory explains under what circumstances computer-mediated communication may result in impersonal, or interpersonal interactions between CMC users, Walther's (1996) theory of hyperpersonal online communication extends this framework by identifying the factors necessary to the development of hyperpersonal communication. Walther (1996) refers to hyperpersonal communication as online communication that is more socially desirable and more intimate than FtF communication.

According to Walther (2001), the hyperpersonal communication framework "offers an approach to the ways that CMC users in some conditions exceed the intimacy, affections, and interpersonal assessments of their partners, relative to parallel FtF activities or alternative CMC contexts" (p. 8). In order to achieve such hyperpersonal levels of communication, psychological processes related to four elements of the traditional communication model need to be activated (Walther & Boyd, unpublished manuscript). These four elements are: (a) the receiver, (b) the sender, (c) the channel, and (d) feedback. The hyperpersonal communication model argues that CMC affects these four variables in ways that are not always possible in FtF interaction and thereby allows computer-mediated interactions to surpass FtF interactions in terms of intimacy and affection.

Message receivers in online contexts are said to contribute to the hyperpersonal phenomenon by idealizing their online partners and engaging in overattribution. Given the reduced cue nature of the medium, CMC users build their impressions of one another on any bit of information they receive about their communicative partner, and in doing so often overestimate the similarities between themselves and their partner. Walther (1996) invokes SIDE (social identity/deindividuation) theory (Spears & Lea, 1992) to explain this overattribution phenomenon. According to SIDE theory (Spears & Lea, 1992), communicators who interact without seeing one another, experience an increased perception of group identity and therefore look for cues about their partner that would highlight their similarities rather than set them apart as unique individuals. When interlocutors cannot see one another, as in the case of most computer-mediated communication, message receivers are thus likely to construct idealized pictures of their communicative partner, because they are looking for similarities in the social cues emitted by the message senders. This idealization of the communicative partner may in turn affect attraction and intimacy levels.

Message senders furthermore contribute to the development of hyperpersonal communication by engaging in selective self-presentation strategies (Walther, 1996). Selective self-presentation refers to the act of presenting a more socially desirable, idealized version of one's self to one's online interlocutors (Walther, 1996). Several factors facilitate the use of selective self-presentations strategies in online contexts. First, affordances for nonverbal leakage, that is "the accidental transmission of unintended

nonverbal behavior or physical appearance" (Walther & Tidwell, 2001, p. 10), are reduced or even eliminated in online contexts. Not only is it difficult for unintentional nonverbal messages to be transmitted through the online medium, but verbal communication also rarely contains unintended messages. Because CMC, and especially asynchronous CMC, offers its users more time when formulating messages, CMC users are more likely to edit and mindfully construct their messages before sending them (Walther, 1996; Walther & Tidwell, 2001). Even more so, CMC users only have to focus on their writing and do not have to attend to a number of factors people engaged in face-to-face interactions have to attend to. Indeed, in computer-mediated interactions, users do not need to monitor their own nonverbal behaviors, or worry about providing adequate feedback to their interlocutor (Walther & Tidwell, 2001). Freed of these normal FtF tasks, CMC users have more cognitive resources at their disposal and are thus able to reallocate these resources to the message construction task. Cognitive reallocation processes, combined with affordances for editing and mindful construction of messages and prevention of nonverbal leakage, thus all contribute to the construction of selective self-presentation messages and to the resulting impressions that are formed by message receivers.

The communication channel is another element of the communication model likely to affect the development of hyperpersonal communication. Asynchronous computer-mediated communication, by definition, allows users to read and compose messages at times that are convenient for them without having to be online at the same time as their interlocutor (Walther, 1994). In non-mediated synchronous work groups, such demands on synchronizing time between group members often pose a big problem. McGrath (1991) refers to this problem as "entrainment". Parks and Walther (1994) further explain that entrainment refers to the synchrony among group members with competing time demands. When group members are pressed for time, the focus of the interaction shifts to task rather than social concerns. Having to decide between getting the task done and maintaining social relations, group members often sacrifice a socio-emotional orientation for the sake of a task orientation. In asynchronous computer-mediated interaction, where users interact at times that are most convenient to them, such problems are unlikely to be observed. As a matter of fact, the hyperpersonal communication model argues that asynchronous CMC actually allows for dis-entrainment to occur. As a result of dis-entrainment, CMC users can attend to both task and

social dimensions in their interactions, which in turn should result in "relatively more relaxed and enhanced message processing" (Walther & Tidwell, 2001, p. 11).

Although the sender and receiver behaviors discussed above, may encourage interpersonal attraction and intimacy to develop, it is through psychological processes related to feedback that these behaviors are intensified to the extreme level characteristic of hyperpersonal communication. Through a process of behavioral confirmation, CMC users influence their perceptions of one another and end up creating a powerful self-fulfilling prophecy. Because of the selective way in which CMC users present themselves to their communicative partner, the message recipient is likely to form a favorable impression of his or her interlocutor and to act upon that impression. By doing so, the message recipient invites the message sender to actually enact the behaviors he or she is believed to possess, thereby creating an intensification loop capable of producing hyperpersonal outcomes. As Walther and Tidwell (2001) explain, "the hyperpersonal perspective depicts how senders select, receivers idealize, channels promote, and feedback increases enhanced and selective communication behaviors" (p. 11). It is important to note that the four variables that lie at the core of this theory do not act in isolation, but are all interconnected in numerous ways.

Besides describing the key variables and examining their relation to one another, Walther's (1996) hyperpersonal communication model also identifies the conditions under which hyperpersonal communication is likely to occur. According to Walther (1996), such communication is more likely to be observed when users (a) experience a social identity and are self-aware, (b) when they are physically separated, (c) when they communicate through a limited-cues medium that enables them to use selective self-presentation strategies without risking to be perceived as deceptive, and (d) when they anticipate future interactions with their communicative partners. Because of its increased affordances for offline editing and selective message construction, hyperpersonal communication is also more likely to occur when users communicate through an asynchronous computer medium rather than a synchronous one.

Implications for System Design

Considering its predictive power in the realm of online interpersonal communication and information exchange, the hyperpersonal communication theory provides a strong framework to base the

design of a distance online learning system on. This section will examine the features that need to be included in an online distance education system in order to create a hyperpersonal learning environment.

The conditions favoring the development of hyperpersonal communication outlined above, can be relatively easily incorporated in an online distance education program. As Walther (1996) has observed, asynchronous communication is a key variable in the development of hyperpersonal communication. In order to create a hyperpersonal learning environment, it thus seems most appropriate to rely on asynchronous communication tools for the main component of the system. The use of an asynchronous learning network (ALN), which allows students to learn anywhere and at any time (Bourne, McMaster, Rieger, & Cambell, 1999), may not only foster selective self-presentation strategies with all its relational consequences, but may also allow students to benefit from the results of dis-entrainment. Because students are able to learn at a time most convenient to them, they have time to focus on task and social exchanges without having to sacrifice one for the other. Research on existing ALNs shows evidence that dis-entrainment is indeed occurring in learning environments that utilize asynchronous computer-conferencing systems (Bourne et al., 1999). Bourne and colleagues' (1999) study reveals that when given the opportunity to learn anywhere at any time, students often shift their learning to the middle of the night.

As Walther (1996) has argued, groups that experience dis-entrainment are given an opportunity to engage in social conversations without having to neglect the task they are working on. By doing so, they come to know each other better and start developing interpersonal relationships. Since ALNs are capable of fostering dis-entrainment (Bourne et al., 1999), the same outcomes should be observable in groups of distance education students connected via computers. The asynchronous learning medium should thus give them ample time to nurture online relationships with other students while at the same time encouraging task discussions and the use of selective self-presentation strategies capable of enhancing already developing interpersonal relationships. In terms of Walther's theory of hyperpersonal communication, adopting an asynchronous computer conferencing system as the main component of the online learning environment directly leads to hyperpersonal channel and sender processes. While hyperpersonal channel processes are activated through the presence of dis-entrainment, sender processes come into play through selective self-presentation strategies.

In order to create an effective hyperpersonal learning environment, the asynchronous learning medium should also be limited in terms of the number and type of cues it can transmit. At first glance, this recommendation to use a limited-cues medium may seem counterintuitive, especially given the great amount of effort that is currently being put into developing CMC systems that come closer to mimicking FtF interaction. Indeed, numerous CMC researchers have focused on designing CMC systems that would make computer-mediated interaction more face-to-face-like (Donath, Karahalios, & Viegas, 1999; Herring, 1999). As Walther (1996) has argued however, this focus on making CMC more FtF like fails to see the bigger picture. Rather than trying to bring CMC up to the standards of FtF communication, research should focus on how CMC users can exploit the advantages of asynchronous CMC in order to achieve communicative and relational outcomes that are superior to those attainable through FtF interaction (Walther, 1996). According to the hyperpersonal communication framework, a learning environment that uses an asynchronous, text-only computer-conferencing system may thus yield more positive outcomes than a medium, which would allow for the transmission of additional cues.

Moreover, since the success of selective self-presentation strategies relies on the medium's ability to hide undesirable personal cues from the message recipient, a text-only medium, which preserves visual anonymity, may be most effective in creating a hyperpersonal learning environment. Research by Walther and Tidwell (2001) provides further evidence for this argument. In their study, they found that introducing visual cues through the use of a picture, may negatively affect affection and attraction levels (Walther & Tidwell, 2001). Online situations, which guarantee visual anonymity, are also more likely to foster the hyperpersonal receiver process of overattributions of similarity. Citing SIDE theory as a framework, Walther (1996) has argued that visual anonymity and physical separation in online communication will lead CMC users to perceive a greater social identity and to perceive other users to be more similar to them. This overattribution of similarity in turn powers one of the four processes involved in the development of hyperpersonal communication.

Besides this obvious advantage, using an asynchronous text-only medium in a distance education setting, may also increase the students' perception of group salience - a consequence that is most important for learning outcomes in a collaborative learning environment (Eastmond, 1995) such as the one outlined in

this paper. While the interactivity of any type of computer conferencing system in and on itself increases students' group orientation (Eastmond, 1995), the added benefit of visual anonymity afforded by some conferencing systems, may act to increase this already heightened group orientation. Incorporating group assignments and group discussions into a course offered through a text-only ALN can even further increase the group salience (Chester & Gwynne, 1998).

In order to create a hyperpersonal learning environment it is also necessary that the system be designed so as convey a feeling of anticipated future interactions. As mentioned above, anticipated future interaction is a key condition of hyperpersonal communication. Walther and Tidwell (2001) use the metaphor of a dark room in an effort to explain how the expectation of future interactions affects communication partners' level of investment with the relationship. Because of the reduced cue nature of most online media, CMC may look like a dark room when compared to FtF communication. While communicators rely on visual cues in a lighted room (like FtF), they need to rely on other senses when entering a dark room such as CMC. With regard to anticipated future interaction, Walther and Tidwell (2001, p. 9) further argue that "if you sense you will be there for a while; you may even discover and appreciate textures and attributes of features you may otherwise not have noticed. If you think that you will not be there for long, you may not attempt to explore."

If an online learning environment is to encourage its students to explore the dark room, it needs to make sure that students actually anticipate long-term interactions with their fellow classmates. Several system and course features may achieve this task. First, students should be put in online groups that will remain the same throughout the semester. By keeping the group composition the same throughout the semester, students are encouraged to anticipate further interactions with the students in their group. Second, the system should incorporate a social space where students can interact with other students about non-task-related issues. Several studies on online distance education have testified to the importance and the benefits of providing such a social space (Chester & Gwynne, 1998; Muirhead, 2000; Wegerif, 1998). Knowing that there is a forum for social exchanges may increase students' anticipation of future interactions simply by reminding them that there is a social space exclusively reserved for such interactions.

Using Walther's (1996) hyperpersonal communication model as a framework for the design of a distance online learning system thus requires that the system incorporate the following features: (a) the use of an asynchronous communication medium, (b) the use of a text-only, limited-cues medium, (c) the use of strategies that enhance group salience, and (d) the use of strategies that foster the perception of anticipated future interactions between classmates. By incorporating these features into the system design, the conditions for the occurrence of hyperpersonal communication are laid. It is not enough, however, to argue that inclusion of these features will result in hyperpersonal communicative outcomes. What needs to be established as well is the theory's ability to enhance not only interpersonal communication, but also student learning and information exchange.

Possible learning outcomes of the proposed system

While all the system features discussed above are likely to activate hyperpersonal sender, receiver, channel and feedback processes which in turn may lead to hyperpersonal communication, the impact of these system features on information exchange and student learning is less clear. Part of the reason is that Walther's (1996) theory does not deal with educational outcomes and instead focuses on relational consequences. Research on CMC and distance education however provides some insight into the expected learning and information outcomes of hyperpersonal learning environments. There is evidence to suggest that learning outcomes can be positively affected by the type of hyperpersonal learning environment described above (Bourne et al., 1999; Eastmond, 1995; Jonassen, 1999; Laffey, Tupper, Musser & Wedman, 1998; Waldeck, Kearney & Plax, 2001). Considering that students in such an environment are expected to perceive a heightened group identity, students are likely to build a community of learners (Chester & Gwynne, 1998; Cole, 2000; Gordin, Gomez, Pea, & Fishman, 1996; Laffey et al., 1998) and peer-to-peer learning is likely to be positively affected (Bourne et al., 1999). In terms of a constructivist conception of learning, the collaboration among students in an online learning community, may greatly benefit individual student learning, since it is through interaction with other learners that constructivists believe that knowledge is formed. Indeed, a constructivist conception assumes that "knowledge is individually constructed and socially co-constructed by learners based on their interpretations of experiences in the world" (Jonassen, 1999, p. 217). Since the hyperpersonal framework predicts social

relationships between CMC users to develop if the conditions of hyperpersonal communication are met, the learning environment discussed above can be expected to foster the development of both social relationships and online communities and should therefore reap the benefits of peer-to-peer learning.

Moreover, research suggests that the affordances for selective self-presentation provided by the asynchronous medium can be used by teachers to increase student learning (Waldeck, et al., 2001). Waldeck and colleagues' (2001) research suggests that students are more likely to engage in online interactions with teachers who come across as highly immediate. In other words, teachers' success at presenting themselves as more immediate in online messages influences students' likelihood to communicate with them. As Waldeck and colleagues argue, immediate electronic communication between teachers and students should lead to positive outcomes such as student learning. By providing teachers with a medium that facilitates selective self-presentations strategies, including strategies aimed at increasing their perceived level of immediacy, the hyperpersonal learning environment described above thus contributes to student learning.

The social relationships formed through computer-conferencing not only influence student learning (Eastmond, 1995), but also information exchange. According to Walther and Boyd (unpublished manuscript), asynchrony benefits the provision of information support by allowing time to look up a response to a question and to craft a good response. Since asynchronous media do not disclose how long it took a respondent to look up the information to a question, respondents may take more time to do so. As a result, the quality of the information exchanged is likely to be increased, and interpersonal perceptions regarding the respondents are positively affected (Walther & Boyd, unpublished manuscript). Research further suggests that the lack of pressure for an immediate response in asynchronous communication networks, also increases student reflection (Wegerif, 1998). Indeed, Wegerif (1998) has argued that asynchrony helps to trigger a different, more creative type of thought besides the "the quick response of the conscious surface of the mind" (p. 8), which characterizes synchronous interactions. Rather than privileging students with quicker thought processes, the asynchronous medium allows the "slow and reflective learner" to contribute just as well as "the quicker and more extroverted student," and thereby fosters an enhanced dialogue capable of affecting learning outcomes (Moore, 1991, p. 6). By giving CMC users more time to

reflect on issues raised during discussions, or to think about questions posted to the group, asynchronous communication media enhance participation rates as well as the quality of the information exchanged.

Participation is not only increased through the lack of pressure for an immediate response though. Factors related to dis-entrainment likewise influence participation rates in asynchronous learning environments. Free to learn anywhere and independently of other students' schedules, students create more time for both task-related and social information exchange. In a situation like this, dis-entrainment can be expected to result in increased levels of information-exchange between distance education students. Information-exchange is furthermore enhanced by the fact that in an asynchronous computer conferencing system, questions as well as answers to questions can be seen by the entire class. Unlike traditional classroom settings in which teacher answers to student questions are usually only shared between the teacher and the student who asked the question, teacher answers can be seen by all learners in an ALN. By making the same information available to every student, asynchronous networks again influence the quality of information-exchange.

Conclusion

This paper sought to demonstrate how the theory of hyperpersonal online communication (Walther, 1996) could inform the design of an online distance education learning system. Hyperpersonal communication was argued to be more likely to occur in asynchronous communication settings in which users anticipate future interactions with their communicative partners, experience a social identity and are self-aware and physically separated, and in which they communicate through a limited-cues medium that enables them to use selective self-presentation strategies. It was argued that in order to create a hyperpersonal learning environment that would positively affect several student outcomes, the learning system needs to be able to recreate the conditions that facilitate the occurrence of hyperpersonal communication. Advocated system features included an asynchronous, text-only communication medium that would increase students' perceptions of group salience and anticipated future interactions.

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